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TENNESSEE VALLEY AGRICULTURAL CORRELATING COMMITTEE

Knoxville, Tennessee

Unnumbered Publication

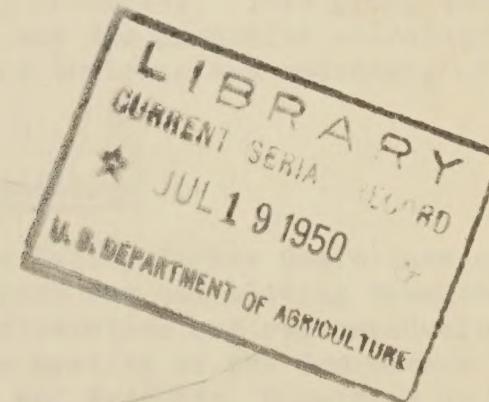
June 1950

X PROCEEDINGS

THIRTY-THIRD VALLEY-STATES CONFERENCE

Hotel Peabody, Memphis, Tennessee

Friday, May 12, 1950



United States Department of Agriculture; Land-Grant Colleges and Universities of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia; and Tennessee Valley Authority Cooperating

ACKNOWLEDGMENTS

Cooperating Agencies

Under a Memorandum of Understanding, dated November 20, 1934, the U. S. Department of Agriculture, Tennessee Valley Authority, and the land-grant colleges of the seven Valley States expressed as their mutual objective in the Tennessee Valley: "To coordinate those phases of the research, extension, land-use planning, and educational activities of these agencies which are related to a unified, regional agricultural program."

Correlating Committee

To facilitate coordinated effort in meeting the problems of the region and to further development of a coordinated program, the Memorandum of Understanding provides for a Correlating Committee to consist of three members and an executive secretary.

Organization. Thomas P. Cooper, Chairman, representing the land-grant colleges; J. C. Dykes, representing the U. S. Department of Agriculture; J. C. McAmis, representing the Tennessee Valley Authority; C. F. Clayton, Executive Secretary.

Valley-States Conference

In order to facilitate discussion of regional problems and to receive advice and recommendations of responsible representatives of the cooperating agencies, the Correlating Committee meets at regular intervals with the deans and directors of the land-grant institutions and with designated representatives of the Department of Agriculture and the Tennessee Valley Authority. This group constitutes the Valley-States Conference. The chairman and the executive secretary of the Correlating Committee serve, respectively, as chairman and secretary of the Conference.

Standing Committees

On request of the Correlating Committee, the Valley-States Conference established a number of standing committees to which the Correlating Committee may refer problems or proposals for special consideration and recommendations or reports. These committees, established at the meeting of the Conference on April 6, 1949, are the Committee on Plant Facilities and Products, Committee on Water and Land Use, and Committee on Rural Facilities, Services, and Industry. The present membership of these committees is as follows:

Committee on Plant Facilities and Products. C. H. Young, Chairman; Walter S. Brown; R. W. Cummings; Roland Crumpler; C. F. Clayton, Secretary

Committee on Water and Land Use. Frank S. Chance, Chairman; Willis M. Baker; P. O. Davis; T. L. Gaston; C. F. Clayton, Secretary

Committee on Rural Facilities, Services, and Industry. R. E. McArdle, Chairman; Frank J. Welch; E. H. White; H. N. Young; C. F. Clayton, Secretary

State Contact Officers

The Memorandum of Understanding also provides for the selection of a State contact officer by each of the seven land-grant colleges. The contact officer seeks to inform the college staff regarding the unified regional development program in the Tennessee Valley and to adjust and coordinate the State program with the Valley program.

Contact Officers. S. G. Chandler, Georgia; H. L. Dunton, Virginia; M. E. Weeks, Kentucky; W. D. Lee, North Carolina; E. C. McReynolds, Tennessee; L. A. Olson, Mississippi; R. M. Reaves, Alabama

Committee on Tennessee Valley Program

To facilitate the work of State contact officers, each land-grant college selects from its faculty a Committee on Tennessee Valley Program. The State contact officer is a member, and usually the chairman of this committee.

TENNESSEE VALLEY AGRICULTURAL CORRELATING COMMITTEE

PROCEEDINGS

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Meeting at
Hotel Peabody, Memphis, Tennessee
Friday, May 12, 1950

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SUMMARY

Agency Cooperation in the Tennessee ValleySpecial Advisory Committee (appendix, p. 60)

The Correlating Committee reported that a meeting of that committee and the Special Advisory Committee was held in Washington, D. C., on November 29, 1949, at which the following persons were present:

S. W. Atkins, Bureau of Agricultural Economics, c/o University of Tennessee
Neil Bass, Chief Conservation Engineer, Tennessee Valley Authority
C. F. Clayton, Executive Secretary, Tennessee Valley Agricultural Cor-
relating Committee
Thomas P. Cooper, Dean, College of Agriculture, and Director, Agricul-
tural Extension Service and Experiment Station, University of Ken-
tucky
P. O. Davis, Director, Agricultural Extension Service, Alabama Poly-
technic Institute
J. C. Dykes, Assistant Chief, Soil Conservation Service, U. S. Depart-
ment of Agriculture
George F. Gant, General Manager, Tennessee Valley Authority
Knox T. Hutchinson, Assistant Secretary, U. S. Department of Agriculture
Neil W. Johnson, Research Administrator, Agricultural Research Adminis-
tration, U. S. Department of Agriculture
J. C. McAmis, Office of Chief Conservation Engineer, Tennessee Valley
Authority
I. O. Schaub, Director, Agricultural Extension Service, North Carolina
State College
A. R. Spillers, Chief, Cooperative Forestry Management Division, Forest
Service, U. S. Department of Agriculture
Ralph R. Will, Office of the Secretary of Agriculture
Stanley P. Williams, Office of the Secretary of Agriculture

Report on work in Haywood County, North Carolina. Mr. Neil Johnson, Regional Project Leader, presented a statement of the results of the research work in Haywood County, including the recommendations reported to the Conference at its meeting on October 5, 1949.

In connection with the work in Haywood County, the committees considered the following questions (appendix, p. 61):

1. Does experience in this study show that we have a method by which Federal and State agencies can jointly determine the developments and adjustments needed on farms in an area, as a basis for a program of assistance to such farm people?

There was unanimous agreement that the answer to this question is yes.

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2. Can these determinations, under the method used in Haywood County, North Carolina, be made with sufficient definiteness to assure that advice and assistance to farm people will be consistent, no matter what agency gives the advice or renders the assistance?

The viewpoint was that results obtained will provide a useful and needed guide but that agreement among the agencies on administrative procedures is also essential.

3. Can the results of such a study be obtained for a sufficiently large area and within a sufficiently short time to make the use of the method feasible for the formulating of the unified agricultural program in the Tennessee Valley?

Mr. Johnson estimated that the cost of the work in Haywood County approximated \$23,000; that the cost in another county, on an experimental basis, would approximate \$20,000; and that the cost of subsequent work might be expected to average \$18,000 a county.

Viewpoints expressed suggested that the estimated cost was not high in relation to the value of this type of work and that by organizing the work ~~to cover~~ ^{to} areas larger than a county, the cost per county might be substantially reduced.

~~to~~ Proposed administrative arrangements. At the request of Assistant Secretary Hutchinson, Mr. Gant outlined suggested administrative arrangements to assure effective cooperation among agencies and institutions. These proposals were discussed at length. At the conclusion of the discussion, Messrs. Dykes and Gant were appointed as a committee to undertake to draw up a mutually acceptable proposal for submission to the Special Advisory Committee (appendix, p. 63).

The subcommittee met at Knoxville on December 14, 1949, and formulated a preliminary statement as a basis for consideration and development of a formal agreement.

~~to~~ Status quo agreement. Assistant Secretary Hutchinson stated that the status quo agreement would be extended to provide an opportunity for the subcommittee to work out and present a proposal to the Special Advisory Committee.

Other Developments

Subsequent to the meeting of the Special Advisory Committee and the Correlating Committee, Assistant Secretary Hutchinson, on January 9, wrote J. Howard Hornsby, Chairman, State Soil Conservation Committee, Peakland, Tennessee, stating: "I can offer assurance that the Department will co-operate with soil conservation districts organized in the Valley area if requested by the districts to do so" (appendix, p. 65).

This termination of the status quo agreement resulted in an exchange of correspondence between Mr. George F. Gant and Assistant Secretary

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Knox T. Hutchinson, revolving around the principal question as to whether termination of the status quo agreement by the Department meant that the Department will extend assistance to farmers under the sponsorship of a farmer organization other than a district. This exchange of correspondence, together with a letter from Thomas Cooper, Chairman of the Correlating Committee, to the presidents of the Valley land-grant colleges, reporting on these developments, is included in the appendix (pp. 63-76).

The exchange of correspondence between Assistant Secretary Hutchinson and Mr. Gant appears to have established a basis for the continuation of discussions relating to administrative arrangements between Mr. Gant and Mr. Dykes, on the assumption, as expressed by Mr. Gant in his letter of May 8 to Assistant Secretary Hutchinson, as follows: "In my forthcoming talks with Mr. Dykes, I am assuming that both TVA relations with districts and SCS relations with existing farmer organizations are open to negotiation, but if I am wrong, please let me know" (appendix, p. 76).

Classification and Analysis of Farms in the Tennessee Valley

A preliminary draft of the report of the study entitled, "Classification and Analysis of Farms, Haywood County, North Carolina: Part I - Narrative," together with Mr. Johnson's letter of transmittal, was mailed to members of the Conference on January 10, 1950.

In its report, the Correlating Committee recommended that consideration be given to the following points in the event that the parties cooperating on the Haywood County study decide to issue a revised report (appendix, p. 77):

1. Describe fully the basis used for classifying farms.
2. Arrange and present the detailed data for sample farms in the framework of the classification.
3. Evaluate the methods used in the study.

At its meeting, the Conference adopted a motion made by Director Dietrick that the preliminary report on the Haywood County study be reviewed, necessary revisions made, and published (text, p. 27).

Agricultural Research Program in the Tennessee Valley

In its report to the Conference, the Correlating Committee stated that there had been prepared and distributed to members of the Conference a tabulation, dated October 9, 1949, entitled, "Preliminary Classification of Major Projects and Activities in the Tennessee Valley Region under the TVA Act, 1949."

In its report, the committee also stated that the following request had been made to the Tennessee Valley Authority (appendix, p. 78):

In order to assist the executive secretary of the Correlating Committee in revising and maintaining on a current basis the "Preliminary Classification of Major Projects and Activities

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in the Tennessee Valley Region under the TVA Act, 1949," it is requested that the appropriate officials of the Authority be designated as points of contact for the executive secretary to obtain the information necessary for these purposes.

By memorandum dated February 17, 1950, Mr. J. C. McAmis stated that it is agreeable to the Tennessee Valley Authority for the executive secretary to contact informally and directly designated officials, for the purpose of obtaining the desired information.

Standing CommitteesSubject-Matter Fields

Since the Correlating Committee has the responsibility of referring matters to standing committees, it has been necessary for the committee to set up a general guide for this purpose. In referring proposals or projects to standing committees, the Correlating Committee will be guided by the following general statement of subject-matter fields.

Committee on Plant Facilities and Products. Proposals and projects relating to (1) products research and investigations, including laboratory and pilot-plant studies, tests, and demonstrations of production methods and techniques; (2) operations of TVA plants, with particular reference to the types and relative quantities of the products of such plants; (3) the acquisition of title or rights to raw materials essential to the proper operation of TVA plants (appendix, p. 79).

Committee on Water and Land Use. Proposals and projects involving relationships (1) of the organization and operation of farms to water control and utilization on the land; (2) of types of cover and land use on small watersheds or other appropriate areas to soil and water conservation and utilization; (3) of types and composition of soils and fertilizers to crop and pasture production and to human and animal nutrition; (4) of program objectives and developments to need for relocation and readjustment of rural families (appendix, p. 79).

Committee on Rural Facilities, Services, and Industry. Proposals and projects relating to the unified agricultural program in the Tennessee Valley which involve (1) cooperation with public or private organizations or groups; (2) interrelationships of agriculture, business, and industry; (3) utilization and conservation of land not in farms and of the products of such land (including the use of land and water for recreational purposes); (4) technical and educational services and investigations relating to processing, marketing, and consumption of farm and forest products; (5) development of farm machinery, equipment, structures, and facilities (including rural electrification). (See appendix, p. 79.)

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Organization (appendix, pp. 80-83)

Terms of members. Each of the standing committees agreed to date the terms of its members from October 5, 1949. Pursuant to the rule adopted by the Conference at its last meeting for the rotation of members of standing committees, the terms of members were decided by lot, as follows:

One-year term	R. W. Cummings T. L. Gaston Frank J. Welch
Two-year term	Willis M. Baker Walter S. Brown E. H. White
Three-year term	Roland Crumpler P. O. Davis H. N. Young

Regular meetings. The Committee on Plant Facilities and Products fixed, as the date of its regular annual meeting, the second Monday in November (appendix, p. 80). The Committee on Water and Land Use fixed, as the date of its regular annual meeting, the second Wednesday in December (appendix, p. 80). The Committee on Rural Facilities, Services, and Industry fixed, as the date of its regular annual meeting, the second Wednesday in January (appendix, p. 83).

Proposed Regional Film on Land Use

Since the meeting on June 18, 1949, on which a report was made to the last Conference (Proc. XXXII, October 5, 1949, p. 3), each director has named a committee from his state to work with the executive committee on the film. From suggestions by these committees, a first draft of the picture was prepared and reviewed both by the directors and their committees. Suggested changes were rather comprehensive and pretty much in accord, indicating very similar trends of thought among the various staffs.

A skeleton treatment for the film was then made by the executive committee. This treatment, together with the more detailed first draft, was submitted to the Southern Educational Film Production Service as a basis for drawing up an agreement to produce the picture. Difficulty in legally handling this joint project has made it necessary to draw up a contract, which is now being submitted to the various parties for signature.

Further details are given in the statement presented to the Conference (text, pp. 28-30).

The composition of the board of directors of the Southern Educational Film Production Service (which is to produce the regional film) was reported to the Conference on April 3, 1946 (Proc. XXV, 58). The present composition of the

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board of directors is as follows (appendix, p. 84):

*L. A. Olson Chairman of the Board	Contact Officer Mississippi Extension Service State College, Mississippi
*Felix Grisette Vice-Chairman of Board	Executive Director Health Publications Institute 216 North Dawson Street Raleigh, North Carolina
*Walter S. Brown Treasurer of Board	Director Georgia Agricultural Extension Service University of Georgia Athens, Georgia
Harry S. Case	Director of Personnel Tennessee Valley Authority Knoxville, Tennessee
E. C. McReynolds	Associate Director Tennessee Agricultural Extension Service University of Tennessee Knoxville, Tennessee
J. E. Oglesby	State Board of Education Richmond, Virginia
H. B. Newland	Director, Division of Forestry Department of Conservation Frankfort, Kentucky
T. W. Morgan	Agricultural Extension Service Clemson, South Carolina
Lois R. Green	Alabama Public Library Service Department of Archives and History 4 North Union Street Montgomery, Alabama
Henry Becker	Florida State University Tallahassee, Florida
William T. Clifford Secretary of Board and Director of Production	Director of Production Southern Educational Film Production Service University of Georgia Athens, Georgia

*Member of the Executive Committee

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Supplements to Proceedings of Valley-States Conference

A statement was made to the Conference at its meeting on October 5, 1949, in regard to a proposed publication of the Correlating Committee, to contain information relating to the work of the committee and of the Valley-States Conference. The eight supplements included in this publication have been issued and distributed to members of the Conference (appendix, p. 85).

Report on Agricultural Development and Watershed Protection in the Tennessee Valley

The Correlating Committee is informed that a report on agricultural development and watershed protection in the Tennessee Valley portion of North Carolina has been submitted to the Tennessee Valley Authority and that in accordance with the request made of TVA by the presidents at the meeting on February 7, 1949, this report will be consolidated with those from the other States into one report covering the entire Valley region (appendix, p. 86).

Conference on the Measurement of County Income

After describing the background of this proposal and presenting a letter from James W. Martin, Chairman, Conference on Measurement of County Income (appendix, pp. 86-89), the Correlating Committee, in its report, states (appendix, pp. 89-90):

The study which we have previously described to you, entitled, "Plan for a Study of the Amount and Structure of Income in the Southeastern Counties," now being undertaken by the Conference on Measurement of County Income, will contribute materially, the Correlating Committee believes, to the fulfillment of this need.

The Correlating Committee has asked the Committee on Rural Facilities, Services, and Industry to establish appropriate working relationships with the technical committee of the Conference on Measurement of County Income. The Correlating Committee recommends that the agencies and institutions represented in the Valley-States Conference cooperate closely with the bureaus of business research of the State universities that are participating in the study in developing the best possible estimates of farm income and wages and salaries in agriculture.

The Conference voted to refer the matter to the Committee on Rural Facilities, Services, and Industry, with power to act (text, p. 33).

Report of Committee on Plant Facilities and Products

The following major topics were included in this report (appendix, pp. 91-113): (1) TVA Forest Tree Nurseries (p. 91); (2) Muscle Shoals Plant Facilities and Products (p. 93); (a) Present TVA Chemical Plant (p. 93), (b) TVA Production of Phosphate and Nitrogen Products, Fiscal Years 1945-49 (p. 96), (c) TVA

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Fertilizer Research and Production Activities (p. 96), (d) Distribution of TVA-Produced Fertilizer Materials, Fiscal Year 1948-49 (p. 99).

Report of Committee on Water and Land UseWatershed and Area Studies

In its report, the committee quoted from a statement made to it by Director Baker, Division of Forestry Relations, Tennessee Valley Authority, as follows (appendix, pp. 113-114):

Over the years, the various divisions and units of TVA have cooperated very closely with a large number of agencies of all kinds working in the Valley, including the land-grant colleges. In many instances, the varied scope of the projects undertaken has covered such a wide area of interests that I think it may have been difficult at times for some of us to keep our attention focused on what are actually the primary objectives and purposes and responsibilities of TVA under its Act of Congress, namely, the unified development of the Tennessee River system integrated with regional development of resources. I think this means, among other things, watershed management which solves problems and develops opportunities involved in the balanced use of land and water. Obviously, the Tennessee Valley program, to be most effective, must be geared to the primary objectives and responsibilities authorized by the Act of Congress which created the opportunity for this program. It appears that the interests of this Committee on Water and Land Use coincide very closely with the basic elements of the Tennessee Valley program. It occurs to me, therefore, that this committee can perform an invaluable service in helping to keep the attention of all of the participants in the Tennessee Valley program focused on the primary objectives of that program.

You may be interested in a measure which the TVA now has under consideration for achieving more concentration of effort and better integration in some of this work. Thinking along the lines I have indicated, our Board of Directors has recently authorized what is known as the small watershed approach, which, primarily, is to explore and test the most effective ways and means of getting things done in the interest of regional development within small, strategic watersheds where important problems and important opportunities exist. This approach will be followed in watersheds where we have reason to believe that the people concerned, and the cooperating agencies concerned, are ready to undertake the work that needs to be done to solve the problems, develop the opportunities, and to measure the results. Essentially, this approach is no different from what has been done, with this one exception: more emphasis will be placed on getting real integration of efforts on all related problems that are pertinent and important in bringing about the development we are all trying to achieve.

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You are familiar with the Chestuee project which was undertaken several years ago and in which considerable progress has been made--a 85,000 acre watershed located in East Tennessee between Athens and Etowah--and where the engineers under Mr. Fry have established a number of installations and studies--installations for stream gaging and measuring rainfall, and various other devices to get knowledge of what is happening there in the way of precipitation, flooding, and so on. The agricultural agencies have set up several area demonstrations within that area. A little progress has been made in establishing forest fire control (now authorized in Polk County), and there are some prospects now of its expanding to other sections of the watershed. Also, an effort was made last year to stimulate tree planting where that was desirable. The project was not thoroughly organized and has proceeded rather less rapidly than we had all hoped for. The TVA is now attempting to help organize such projects more effectively under this small watershed approach, and the Chestuee project is the first one under consideration. We are now preparing authorization for approval.

The Committee on Water and Land Use reported to the Conference that the committee had adopted the following motion made by Mr. Baker (appendix, p. 122):

That this committee recommend the initiation of more watershed studies similar in design and purpose to the subproject entitled, "Effect of Type of Vegetation and Pasture Management on Water Conservation and Utilization in the Mountain Area of North Carolina," in order to determine the facts of the interrelationships of optimum land and water use under various important conditions of soil and cover.

Flood Control Studies and Investigations

A. S. Fry, Chief, Hydraulic Data Branch, Tennessee Valley Authority, discussed this work with the committee (appendix, pp. 114-117). Mr. Fry said, in part (appendix, pp. 114-116):

We are concerned, of course, with respect to our reservoirs and streams and erosion problems. We have made enough studies of the silt carried by streams throughout the Tennessee Valley and the sedimentation in our reservoirs so that we are satisfied that we do not have any very acute problems there. Our reservoirs, on the whole, will have useful lives at several thousand years, but obviously the more erosion we can eliminate, the longer the lives of those reservoirs will be. Some of our main-river projects will have the shorter lives even in those long-lived projects, so that it is important that areas like Elk River, for instance, be treated as well as possible from the standpoint of vegetal cover, so that erosion is minimized to the maximum degree. We are also interested in the effect of cover on runoff, particularly as it may influence the seasonable distribution of runoff. That is a question on which we will not find unanimity of opinion, either in TVA or outside. We certainly need to carry out experiments to really find out whether, by changing cover, it will be possible to change the runoff characteristics sufficient to affect the water in the stream and the quantity of water that is available at different seasons of the year that might

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be useful when it reaches our power production plants. It has been proposed to change the cover so that there will be more groundwater available at the end of the summer for fall runoff at the time water is usually needed for power. Whether such changes are possible is something to which we do not know the answers, but we certainly need to know the answer in water and land-use problems (p. 114).

• • •

Cover ties into the matter of underground water because of the possibilities that good cover can put more water underground and make it available for sustaining stream flow during the times when it can be of most use to the river system. There is a definite tie from that point of view. The problems of small watersheds, which Mr. Baker told us about, are getting more and more acute throughout this area. I attended a hearing yesterday at Greeneville, Tennessee, which was conducted by the Army Engineers in connection with a proposal there by the people in the Lick Creek Valley, near Greeneville, for the Government to study that and make a plan for flood control for Lick Creek Valley. That is one of a number that have come up recently. There were two others last week down in Alabama on the Paint Rock and Flint Rivers, and there is one coming up down in Alabama on Mud Creek, a couple in Tennessee on Soddy Creek, and one near Dunlap in the Sequatchie Valley. Those are small valleys where the flood problems have caused the farmers to want to see if there wasn't something that can be done about the situation (p. 115).

Unfortunately, the probabilities are that in most cases, it is not going to be economically feasible to do anything by engineering methods, that is, by constructing channels and building levees, dams, and things of that kind. The cost in most cases would be so great that it wouldn't be economically feasible to do the work. That gets close to the work of this committee, which is work on the watershed which will alleviate and mitigate the flood problems which those watersheds are now faced with. Take Lick Creek, for instance; the Valley up there varies from one-half to three-quarters of a mile, with some 8000 acres in a distance of about 50 miles. If you build a channel that would be big enough to take care of the water that comes down there, it would take a large part of the Valley. Water runs in from the sides of the watershed, and that water has to be taken care of. It becomes a very expensive proposition. If you can do something on the watershed itself that will help the situation, then that certainly is a fine thing to have done. In most of these watersheds, the problems are going to resolve themselves down to that kind of a solution (p. 116).

Farm Classification and Analysis

J. W. Moon, Assistant Director, Division of Agricultural Relations, Tennessee Valley Authority, made a statement to the committee on the subject of farm classification and analysis (appendix, pp. 123-124).

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In order to explore this subject further, the Committee on Water and Land Use set up a special committee, to be known as the "Committee on Method and Procedure for Farm Classification and Analysis in the Tennessee Valley." Mr. Samuel W. Atkins and Mr. Lester E. Odom, U. S. Department of Agriculture; Mr. Kenneth J. Seigworth and Mr. J. W. Moon, Tennessee Valley Authority; and Mr. H. J. Bonser, University of Tennessee, were appointed on this committee. Mr. Atkins agreed to serve as chairman. The special committee was requested to prepare and submit a report to the Committee on Water and Land Use on the following items (appendix, p. 124):

1. Review the methods employed in the farm classification and analysis study in Haywood County, North Carolina, and suggest such changes or improvements in method as the committee may find to be desirable.
2. On the basis of the methods proposed, suggest a procedure for applying the method on a regional basis in the Tennessee Valley.

The special committee has not yet submitted its report.

USDA Estimates of Production Goals

There was laid before the Committee on Water and Land Use a letter of September 12, 1949, assigning to that committee responsibility for further exploration of the subject of USDA estimates of production goals in the Tennessee Valley.

The committee postponed consideration of this subject (appendix, p. 125).

Other Topics

Other topics discussed in the committee's report (appendix, pp. 118-120) include soil and water management (p. 118) and soil and fertilizer investigations (p. 120).

Report of Committee on Rural Facilities,
Services, and IndustryDevelopment of Tennessee River Waterway in Relation
to Agriculture in the Tennessee Valley

A. J. Wagner, Chief, Navigation and Transportation Branch, Division of Regional Studies, Tennessee Valley Authority, made a statement to the committee on the development of Tennessee River waterway in relation to agriculture in the Tennessee Valley (appendix, pp. 137-140). With specific reference to agriculture, Mr. Wagner said (appendix, pp. 138-139):

Now let's examine some of the more specific relationships of Tennessee River transportation to agriculture. The most direct and

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readily discernible point of contact at the present time lies in the barge shipment of grain from farms of the Midwest into the ports of Decatur, Guntersville, Chattanooga, and Knoxville, in the Tennessee Valley.

The Tennessee Valley region in general now consumes more grain than it produces. A large part of the deficiency is supplied by the surplus grain-producing farms of the Midwest. At the present time about 100,000 tons per year is moving into the region by barge and indications are that a considerable increase can be expected in the future. Transportation savings are as much as \$4 per ton, which is about one-third of the total all-rail transportation charge. (Along the Illinois waterway farmers reportedly are paid about five cents per bushel more for grain delivered to river-front terminals for barge shipment beyond than for grain delivered to rail-side elevators for rail shipment beyond.) There are already several new grain elevators, flour and feed mills in the Tennessee Valley, representing a capital investment of about one and one-half million dollars and directly providing several hundred new jobs on the banks of the Tennessee. Valley farmers interested in improved farming practices are growing more livestock and some of the barge-shipped grain is going into feed for poultry and livestock. These developments have contributed to the expansion of business opportunities in the Valley; for example, a new plant in Decatur, Alabama, is now annually processing well over two million dollars' worth of grain-fed chickens raised on local farms.

Farmers are also interested in the fact that the new grain elevators at Guntersville and Decatur have provided a ready market for locally grown grain. At Decatur, for example, in its first year of operation, Alabama Flour Mills reports that it was able to buy only 3000 bushels of locally produced grain. But in 1948 it was able to buy 677,000 bushels, for which it paid local farmers nearly one and one-half million dollars. At the same time, its receipts by barge, largely from St. Louis, increased nearly three-fold from 1941 to 1948. In addition, feed mills have been established in connection with some of the water-front grain elevators. These mills have provided a further market for other local farm crops. You probably are familiar, for example, with the plant near Decatur, Alabama, which produces dried and chopped alfalfa, selling some of its product to a feed-mixing plant which is tied in with one of the waterfront elevators in Decatur.

Another area of direct effect upon the farmers is in the marketing of forest products. Ties and lumber cut from farm lands near the river have moved to market by barge in considerable volume in the past and continue to do so. This is especially true in that reach of the Tennessee River between Wilson Dam and Paducah. In this area there are several timber landings operated by the counties in which they are located, and a larger number of others which are privately owned and operated. Before the war the producer was paid a premium (generally about 15 cents per tie) for ties delivered to

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river-bank landings as compared with those brought into rail-loading points. This margin was discontinued during the war, and I am not sure whether it has since been reinstated.

Still another area of particular interest to agriculture is the shipment of farm machinery by barge. This is quite an extensive operation on other rivers and it should ultimately develop on the Tennessee River, although it has not been undertaken here as yet. Manufacturers find it economical to ship all sorts of farm machinery by barge from their assembly plants to water-front warehouses at major distributing centers and then distribute to the retail dealers and others by truck or rail. Savings on farm machinery are quite substantial, amounting in some instances to more than \$10 per ton.

In addition to these specific traffic items, the farmer has the same broad interest in water transportation which any consumer has. About eight percent of our national income, on the average, is spent for transportation; and transportation costs make up about ten percent of the average wholesale price of commodities. In some instances, of course, the effect of transportation costs is even much more pronounced. Grain, coal, and fertilizer are good examples. In extreme cases, transportation may account for more than half of the delivered price of a given commodity. To the extent that water transportation can be used to reduce transportation costs, the ultimate result must be lower prices for consumers.

Other Topics

Other topics discussed in the committee's report include: (1) Rural Recreation Resource Development; (2) Population and Economic Trends as Related to Agriculture; (3) Relationships with Distributors of TVA Fertilizers; (4) Agricultural Research and Development; (5) Forest Resource Development.

Watershed Protection ProgramAddress of Director Harry A. Curtis

In his discussion of the relation of the Tennessee Valley watershed to its streams (appendix, pp.125-133), Director Curtis pointed out that the rainfall which reaches the Valley watershed, on the average 51 inches, or 150 billion tons annually, may be considered as flowing through six kinds of reservoirs which store various fractions of the total, for various periods of time. These six are:

1. The reservoir afforded by the external surface of the vegetation on the watershed
2. The reservoir afforded by the internal storage of water in the vegetation itself

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3. The reservoir afforded by the soil and subsoil
4. The reservoir of ground surface runoff
5. The underground reservoir
6. The artificial reservoirs

Director Curtis said (appendix, pp. 126-132):

It comes as a surprise to most people to know that of all the water that falls upon the Tennessee watershed, less than half leaves by way of the rivers. Over a long period of years, the average rainfall is 51 inches. If, then, you take a similarly long record, say 50 years, of the water flow at the mouth of the Tennessee River, you come out with approximately 65,000 cubic feet per second. Translating that back into rainfall, it appears that the watershed is taking care of 58 percent of the total rainfall on the average, and the river is taking out the other 42 percent. In other words, here is a watershed which prevents 58 percent of the rainfall, on the average, from ever getting into the river. Therefore, it is nonsense to say that the watershed has no relationship to the flow of the river; I have heard some of the engineers make that statement, but obviously that cannot be true if the watershed is taking 58 percent of the total (p. 126).

• • •

The TVA has interested itself in what happens on the watershed both from the standpoint of agriculture and the people that live on the watershed, and because the watershed is closely related to the stream flow. We are recommending that this or that be done on the watershed. When it comes to the farms, what happens on the farms, TVA's interest is shared with other organizations who are more directly charged with that phase of the problem than is the TVA; but when it comes to the relation of the watershed to the stream flow, TVA has a special and unique interest. Therefore, I am hoping that out of the studies we have made, it will be possible for the TVA to find out which of the proposed land-use changes are desirable agriculturally and, from such a list, select the ones that are particularly of TVA interest because they affect the stream flow (p. 129).

• • •

I was interested to see if I could get some figure on what these various natural and artificial reservoirs amount to, in the first place, in capacity, and, in the second place, in yearly input and output. Seven and one-half inches of rainfall is my guess as to what the vegetation reservoirs may take care of. The living material on the watershed takes care of only a fraction of an inch, so far as I can figure. The estimate for the soil reservoir presents a difficult problem. The soil reservoir loses water from the surface of the soil and through the transpiration of living vegetation.

PROCEEDINGS OF THE CONFERENCE

Probably more goes out of that soil reservoir through transpiration than goes out by evaporation from the surface. Just what proportion of the total loss each process accounts for is uncertain. We have water gages of various sorts at many points in the watershed, and from them we may eventually get a pretty good picture of what the storage capacity of this soil reservoir may be. I suspect it is going to show that about six inches of rainfall are stored in the soil reservoir. That water doesn't get into the streams at all. We do not know very much about the capacity of the underground reservoir. We know much more about how much goes in and goes out, but the capacity is a thing that is almost impossible to measure. We know what comes out and what goes in, i.e., we know the fluctuation. The character of the underground reservoir varies enormously over the watershed. In some of the individual watersheds, the annual fluctuation may be as low as three inches of rainfall. In the upper ends of the watershed, there are places where it goes up as far as eight. I am told that on the average, at the beginning of the dry season, we can count on three or four inches of water available in that underground reservoir. During the first month most of it will come out; in the next month, another fraction; and in the third month, nearly all that is left. So the underground reservoir is fairly dry at the end of about three months if not replenished (p. 130).

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In view of all these things, what, if anything, can be done with reference to changes in land use? The first criterion to be met is that the proposed change must be favorable to agriculture. TVA cannot for a moment consider changes from the standpoint of stream flow if such changes are not favorable to agriculture; at least, acceptable to agriculture. Some of the proposed changes which might favorably affect the streams are such as to be desirable agriculturally (p. 131).

• • •

Mention has been made of the small watershed. TVA is turning particular attention to the small watersheds because there, we believe, is the opportunity to accomplish, in the early future, certain very desirable things. In the Chestee watershed, for instance, three years out of five crops are damaged; one year out of five they are completely ruined in all the bottomlands of the Chestee valley. We sent our engineers down there, and they said, yes, we can open up the channel again and in a few years the channel will be plugged again, and we shall have the job to do over. They won't touch the channel in the Chestee until the agriculture people keep the soil back on the hills. Then the engineers can open up the channel and let the water that does come down get away instead of spreading over the bottomlands. The problems of agriculture and engineering on the streams tie in together. The Chestee watershed has been selected by the TVA for an intensive study of some of these problems. If we go into the Chestee watershed now and we do what seems desirable with respect to forestry on the advice of competent folk, and we get a meeting of minds as to what is the best thing to do with reference to cover crops, pastures, etc., in a

SUMMARY

few years we shall have an overall result, but we will not know what part of the result was due to one of the things done and what part was due to another. In order to be able to apply the results obtained to other watersheds, it will be necessary to get a lot of information on which to break down the overall results. We have planned in our program for Chestee to set up some quantitative experiments that will help in interpreting the results and will make the results useful in handling other watersheds (p. 132).

• • •

It is a tremendous job, obviously it is, but maybe we can arrive at a better situation with respect to land use than we now have in the watershed. In the 30 reservoirs that TVA controls, the normally used storage amounts to three and six-tenths inches of rainfall. In other words, the underground reservoir is as large, or possibly larger, than the artificial reservoirs. If we are going to increase the effectiveness of the artificial reservoirs in generating cheap power and getting more of it out on the farms where it can be used so profitably, it is important to see what can be done in respect to the underground reservoir. That ties in immediately with the soil reservoir, and it ties in with the transpiration of plants, and with problems of agriculture and soil science. I am hopeful that if we keep on we can tie all the factors together and finally arrive at a program that is more rational than any that has been devised to date (p. 132).

Winter Cover and Seed Production Program

Mr. Bass made a brief statement in regard to this program (text, pp. 43-44). Mr. Bass said, in part (text, pp. 43-44):

As Mr. Walthall stated this morning, the TVA plant is a research plant in the first instance, and, as such, it is a public plant in terms of being devoted to bringing about those changes in agriculture that are desirable in the public interest. Of course, phosphate, by its nature, is a basic and key element in bringing about those changes in agriculture that are generally deemed to be in the public interest. As Dr. Curtis pointed out at his talk during lunch, it is the key element in helping to make possible that type of agriculture in the region that combines the desirable agriculture objectives and watershed protection and water control objectives. As Mr. Walthall pointed out this morning, we were projected into the large-scale production of nitrogen during the war, first for explosives, and then, as the situation changed, to fill an equally vital need for the production of agricultural products.

Since the war, and up until the current year, there have been tremendous demands for nitrogen fertilizer for what we look upon as ordinary production objectives. During this period, however, we have gained experience in the region, as a result of your research and the development of farming systems on the test-demonstration farms, to show, particularly, the opportunities for what might be broadly

PROCEEDINGS OF THE CONFERENCE

referred to as a pasture agriculture. There has been a perfectly amazing revolution in farming systems in that regard. The work at the Belle Mina Station is an amazing demonstration of the amount of grazing and forage that can be produced per acre of farm land. Of course, one of the dominant influences in how rapidly shifts take place toward a winter pasture agriculture is the extent of use of minerals in such an agriculture.

This marvelous work in establishing in this region the "know-how" of winter covers has led the TVA Board to express the hope that we might rapidly move to the point in which the products of the TVA plant should be directed more intensively for use in this desirable public objective of more widespread winter cover, and the use of the cover for livestock grazing. Beginning this July, the TVA Board approved the inauguration of what we have looked upon as a rather large-scale and exciting test of whether we might not put the product of this plant to giving an effective push to that program. Specifically, they have approved the setting aside of 25,000 tons of ammonium nitrate for use in the Valley at a discount below the market price, provided the agencies who are concerned with agricultural uses wish to get together on this program and enlist the cooperation of the farmers of the Valley and really conduct a test this fall and winter as to whether this amount of nitrogen, and more if necessary, could be put into a vigorous winter cover and seed production program.

As you know, the TVA staff is in the midst of holding discussions with colleges, PMA, cooperatives, and others concerned. I don't believe that in a single instance any agency concerned hasn't said that this is the very thing they wanted to do and that they are glad that TVA is taking this positive step with respect to this block of material.

Mr. McAmis made a statement in regard to steps proposed to inaugurate the program (appendix, pp. 44-46). Mr. McAmis said, in part (appendix, p. 45):

The next step on this, it seems to us, is to work out the practices within the States, the Valley parts of the several States, which would be agriculturally sound, which would best serve the interest of watershed protection in the Valley, and which would be, at the same time, in the interest of desirable agricultural adjustments, not only from the standpoint of the local area, but from the standpoint of the region and the Nation as well. In three of the States, beginning in Tennessee, in Alabama, and in Mississippi, committees have already been organized, made up of representatives of the institutions, of the cooperatives now distributing TVA fertilizers within that area of the State, and of the TVA and PMA. Those committees, it seemed to us, are the ideal machinery to work out the selective uses to which this nitrogen fertilizer ought to be put.

Without a formal vote, the Conference agreed in the proposed winter cover and seed production program in the Valley and in the arrangement proposed for inaugurating the work (text, p. 56).

THOMAS B. HUTCHESON

Next Meeting of Conference

It was agreed to hold the next meeting of the Conference in Roanoke, Virginia, on Wednesday, October 4, 1950 (appendix, p. 90; text, p. 33).

OPENING OF THE CONFERENCE

In the absence of Dean Thomas Cooper, Chairman of the Conference, Dean I. O. Schaub presided. The meeting was called to order at 9:10 a.m.

(For the roll of the Conference, see appendix, p. 57; and for the program of the Conference, see appendix, p. 59.)

Director L. B. Dietrick read the following memorial statement honoring the memory of the late Dean Thomas B. Hutcheson.

On Saturday, April 8, 1950, a man well known to each of you stepped out to meet his God. On that date the Agricultural Faculty of the Virginia Polytechnic Institute lost the guiding hand of Thomas Barksdale Hutcheson, respected Dean and beloved friend. His interest and influence have extended far beyond the state's borders. He has always enjoyed meeting with this group and this group has profited from his friendly counsel. His spirit remains with us an inspiration to high purpose and noble effort.

The Virginia Polytechnic Institute and its broad campus, the State of Virginia, and the Nation have been enriched by his presence and devoted service; let us be grateful.

Dr. Tom was a gentle man, a kindly and understanding friend. Most of us will treasure through the years some special association that gave us a lift along life's journey.

He passed from this life's scene in a manner befitting his sojourn here. Following a full day of service to his State and association with friends, he was resting in his home with his beloved family when God's summons came. A man who had done justly, loved mercy and walked humbly with his God passed to his reward.

We extend our love and sympathy to the bereaved family and ask them to remember that the greatness of their sorrow reflects the greatness of their blessing.

Let us pause to revere his memory and give thanks for the life he lived.

A motion was made by Dean Harry L. Brown and seconded by Director P. O. Davis that the statement be adopted and that a copy be sent to Mrs. Hutcheson.

The motion was agreed to.

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REPORT OF CORRELATING COMMITTEE

Dean I. O. Schaub presented the report of the Correlating Committee (appendix, p. 60). Proceedings relating to this report follow.

PROGRESS REPORT

DISCUSSION

Agency Cooperation in the Tennessee Valley

(Appendix, p. 60)

Schaub. I understand that more recently there have been further developments. Who could give us a report on that?

Clayton. I was hoping that Mr. Bass would be willing to make a statement on the present status of the proposed meeting between Mr. Gant and Mr. Dykes and whether that is now back in the picture or what the situation is.

Bass. Dean Schaub, I might just supplement the report as you read it. The assumption had been made that the Department had indicated that it would go ahead and service districts that may be organized in the Valley. Mr. Gant assumed that that ended the status quo arrangement and, according to the interpretation that TVA put on Assistant Secretary Hutchinson's letter, it seemed that farmers could get the benefit of SCS assistance only by the organization of districts. However, that question, according to more recent correspondence from Assistant Secretary Hutchinson, seems to be an open question, and the Assistant Secretary did suggest that Mr. Dykes and Mr. Gant continue their deliberations. At the present moment I know that Mr. Gant is waiting for a time to be indicated by Mr. Dykes when they might meet. In the meantime, however, I think the correspondence, as you reviewed it, makes it very clear that should districts be organized in the Valley, SCS could be expected to furnish technical advice and assistance as it might be asked for. Mr. Gaston, who is here, might want to supplement that statement. That is my interpretation, at least, of the correspondence.

Gaston. I do not know of anything that I could add to it.

Schaub. Do you wish to ask any questions now as to the developments up to the present time? I do not suppose that many of you have seen all the correspondence. Is everybody satisfied?

McAmis. I think it ought to be made clear, Dean Schaub, that so far as the correspondence itself is concerned, it is a very difficult

AGENCY COOPERATION IN THE TENNESSEE VALLEY

McAmis.

matter to determine whether there is a final decision on the part of the Department that the farmers in the Valley have a choice of methods of receiving SCS assistance or whether they must organize districts. That is still a matter of uncertainty according to our most recent correspondence. I do not know from reading the correspondence what the actual facts are.

Clayton.

Lee (Mr. Gaston), I do not know whether this would be a proper or fair question, or a pertinent one, but I should like to ask it. If the technical personnel of the Soil Conservation Service is to be made available to the Production and Marketing Administration in conjunction with the ACP program, would it be feasible to render that service and yet restrict the work of the SCS to districts? How could that service be rendered and at the same time confine activities to districts? The reason I am asking that is that I understand, under pending legislation, the SCS might be called upon for such assistance.

Gaston.

It is in the legislation for the fiscal 1950 agricultural conservation program. It is in the current bill with respect to the 1951 agricultural conservation program. The procedure or methods developed for the administration of that provision in connection with the 1950 agricultural conservation program did not limit it to any geographical area except to those counties where it is practicable to carry it out.

Clayton.

It is not limited to districts?

Gaston.

No.

Schaub.

In the 1950 program, at least our State PMA committee left it entirely to the county as to whether they would call for it. Is that the general idea, as far as the legislation is concerned?

Gaston.

Dean, according to the legislation in connection with the 1950 program, I should say that that is what the legislation provided--that it would be determined by the respective county PMA committee and then the SCS as to whether or not it could. After all, sometimes you can't.

Schaub.

As I recall the legislation, it authorized the counties to use up to a certain percentage of their funds.

Gaston.

Five percent, if you wanted to, and the legislation also provided for approval of the State committees.

Schaub.

I am not sure, but I do not believe that any of our counties in North Carolina called for it. They may have.

Gaston.

I do not remember. The summary as of the first of May--I am not sure that I have these figures right, but approximately right--as of the first of May, the arrangement had been

PROCEEDINGS

Gaston.

consummated in 65 counties in the United States, but just as to the distribution among the States, I do not remember. I do not know for sure that it was 65, but it was approximately that. In the current bill--Roland (Mr. Crumpler), you check me on this if I am not right--in the current bill the language is still in there, just a little bit different wording than it was before but the principles, as I, at least, interpret them, are the same as those in the bill for the 1950 program year.

Schaub.

Any more questions in connection with that situation? Having direct relationship with this question of correlation, we had a petition from one of our counties in the Valley to set up a district in the county. At that time, I wrote to Mr. Hutchinson and advised him of this petition and asked him specifically whether, under the policies of the Department, they could work with the existing organization, the Agricultural Conservation Association that has been in that county for the last 15 years. This is the Secretary's reply. I am going to read it just as a matter of information.

March 9, 1950

Dear Director Schaub:

This is in reply to your letter of February 17, inquiring about the attitude of the Department of Agriculture toward cooperating with the Agricultural Conservation Association in Avery County, North Carolina, in the same manner that it cooperates with soil conservation districts.

Since you indicate that you have no information as to the desire of the organization in Avery County and basic factual information is not available to us, a definite answer is not possible at this time. However, we shall, of course, be glad to consider an application from the Association for assistance from the Department. Among the types of information that should accompany such an application are: (a) the Articles of Association or other documents evidencing the existence of the organization, its purposes, and the principles on which it functions, (b) a copy of, or the code reference to, the law under which the Association is organized and operated, and (c) a description of how the Association functions.

Assuring you of our desire to cooperate in every practicable manner, I remain

Sincerely yours,
 /s/ K. T. Hutchinson
 Assistant Secretary

I was inclined to answer that letter, but I haven't.

FARM CLASSIFICATION AND ANALYSIS

Classification and Analysis of Farms

(Appendix, p. 77)

Jones. Who writes up the plans?Schaub. It was written up by representatives of SCS, Extension, TVA--the Technical Committee. There were two representing each of the groups.Jones. Any farmers?Schaub. No, there were no farmers. Of course, they conferred with the farmers when they went out to work on these individual farms. They were trying to apply the procedure they had agreed upon in the reorganization of these farms.Clayton. I'd like to raise two questions about this job: The first relates to the report, which has been issued as a preliminary report. It has been suggested from one or two sources that the preliminary report should be reworked and issued as a final report. I think that any suggestion that this be done should be accompanied by a suggestion on how to get it done, but still it is a question. The second question is to Mr. Crumpler. I understand that PMA is going to work in Haywood County, and I should like, for my own information at any rate, to learn whether you are able to make any use of this work that was done there.Crumpler. We provided the folks who are working on the farmers' conservation program with the material developed in the study that you folks engineered. I am not prepared to say what use they made of it, but they have it available for their work. Their work is just getting under way and it hasn't progressed far enough to know just what course they will take in utilizing this material.Schaub. I believe it is this week that representatives of the various agencies are going up there for further study of that in Haywood County, as well as another county. Those plans were developed in two of the counties. When I talked to some of them a few days ago, they did not know as to what the plans might be to utilize the material. The committeemen had gotten their data together. Whether it has been summarized now, I do not know.Crumpler. I do not think it has yet.Clayton. May I revert to the first question and inquire specifically whether anyone has any suggestion or viewpoint in regard to developing this preliminary report into a final report and putting out an official publication of this study?

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Gaston.

As I understand the modus operandi--and I am not sure I understand it--and as I understand the original purpose of this Haywood study, and as I understand the current status of it, it would seem to me to be highly desirable, some way or other, to tie it up in a bundle with a stamp of authenticity on it, and print it, as most research work of that type should be done. I am not sure that I understand those three things thoroughly--the modus operandi, the original purpose, or the current status.

Schaub.

Personally, I think it ought to be printed or duplicated and made available to those who would be interested in it. It was a research study to try to apply, that is, to agree on a procedure. With the three agencies working together, they did agree on a procedure and then the research part was to apply, taking into account the size of farms, types of farms, and so on. Mr. Moon was a member of that Technical Committee. He is here. Could you supplement that any, Mr. Moon?

Moon.

Dean, did you have in mind what the purpose of the study was?

Schaub.

I am trying to answer, in a way, Gaston's inquiry there and as to the advisability of seeing if it could be printed, if it were thought advisable.

Moon.

From the standpoint of a technique for classifying farms, personally, I take the position that there is quite a bit of work to be done. I don't think we can develop a finished, satisfactory scheme of any sort--farms, soils, plants, or anything else. Of course, there is a little difference between classifying farms and classifying plants. The classification of farms is probably a little more practical and utilitarian. Insofar as the resources of the farm are concerned, it is not too different. At any rate, I think that we have got to do quite a bit of studying, that we have some improvements to make. We cannot do it all at once.

That is my personal opinion.

That doesn't mean that it wouldn't be all right, perhaps, to get suggestions from the proper sources, that may be offered to improve that tentative report, and finally publish it. I do not think that we should feel that the scheme or procedure of farm classification has been finally completed and that there isn't a lot of work to do on it yet. For example, we have been working on soil classification for 50 years, and we still have a lot of work to do to perfect that classification and to improve it. I hope it won't take us 50 years to get a satisfactory scheme of farm classification, but I do not think we can expect to do it in a year or two. I do not think that is any reason why, however, the report could not be published with that explanation.

FARM CLASSIFICATION AND ANALYSIS

Dietrick. Is the study in Haywood County still in progress, Dean?

Schaub. They completed the study. The report they got out was a preliminary report. I should judge they would not make very much in the way of revision on a final report. They made their recommendations for each of these farms and, as I say, our people are working with those farmers, trying to put it into effect.

Clayton. Dean, within TVA, and also within the Department, I have had suggestions that the preliminary report should be reexamined, reorganized, and revised. Since I have had suggestions from both sources along that line, the question presented to me was, should that be done; if so, through what process. Should it be put out as a finished, official report? If so, in what form? Those are the questions I am trying to present to the group. It will take some doing to get the report gone over and revised. I cannot visualize, at the moment, how to get that done. If it is the desire of the group that it be done, it is something we should work on.

Schaub. Gaston, you have gone over it carefully. What do you think? What is your reaction on it?

Gaston. My reaction, Dean, is the same as with practically all research work. We never get a final answer. If we got the final answer, the progress that has been made in American farming in the last 50 years would not have accrued. I am sure that the ideas and approaches described in that study at the current stage are subject to many limitations. I am sure it is not the final answer. I am also sure that the final answer will not be gotten in the next 50 years or the next 100 years. There is no final answer. If we, who are paid by the public, contribute our part toward this progress and improvement that I think must happen and is going to happen, we have got to take it step by step and recognize that we never have the final answer.

Farm classification, as a subject, has been worked upon for at least three or four decades, and similar to most of the agro-nomic, engineering, economic, and other phases of the total problem, there is yet no final answer; and I repeat that I don't think there will be an answer in the next 100 years, much less the next 5. I think we owe it to the people by whom we are paid, step by step, to complete, call it preliminary if you want to, the work that we have spent our efforts on and put it in form where a lot of people, other professionals and others than professionals, can have a look at it and use it to the degree that it is useful. I think we make a serious mistake when we do not carry these kinds of things on to the point where we print them and get them to the places where that kind of printed material is useful. Personally, I do not consider myself an expert in the field of farm classification, but I consider that the draft, the preliminary report, whatever other term

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Gaston. might be well to label it, to represent a rather well-done job. I could pick flaws in it, sure, but nevertheless I think it is a well-done job.

Schaub. I met a class of seniors the other day, and I told them not to believe anything that they were taught in college. I used several illustrations to bring out the point that many things had been recommended in the past that were no longer recommended. One of them was in connection with poultry production. I called to their attention that within less than 10 years, in fact, 5 years ago, poultry people were making certain recommendations in connection with sanitation of the poultry house, and so on, that subsequent research had shown was not true, and now they were recommending things diametrically opposite those recommended 5 years ago. I have said to our agents several times, you had to go back and tell the farmer that what you recommended 5 years ago was wrong but what you recommend now is right. In another 5 years, it will be the same thing over again. I was kidding a poultry extension man with reference to it afterward, and after a few days he came in and said, "Ever since you mentioned that I have been trying to think. I can't think of a single thing that we recommend now that we recommended 5 years ago." I think that has a bearing on what you said. The job on a matter of that kind is never really finished.

Any further comments or discussion in reference to it? I notice here in the report of the committee, the special Committee on Water and Land Use, that they may have something to say on method and procedure that may come out in that report.

Continued on p. 27.

Agricultural Research Program in the Tennessee Valley

(Appendix, p. 77)

Schaub. The next topic is the "Agricultural Research Program in the Tennessee Valley."

Clayton. On this topic that Director Schaub refers to, the agricultural research program, I wish to recall to the Conference that we made some efforts some time ago to get a summary of research activities, particularly the kind of research that was pertinent to program relationships in the Valley, specifically for the information of the Correlating Committee and as a basis for reports to the Conference and to the principals. The Correlating Committee went ahead with that job and brought together a preliminary classification of current projects and activities in the Valley to which the Tennessee Valley Authority is a party. That classification has been prepared and copies have been sent to

STANDING COMMITTEES

Clayton. members of the Conference.^{1/} It is the present thought, I believe, of the Correlating Committee, that with some changes of approach, we may undertake to prepare and issue such classifications annually. That is the substance of what the committee is undertaking to report here, and if it raises no question, I think we can settle with that brief statement on the matter.

Schaub. Any questions on that?

Classification and Analysis of Farms

(Continued from p. 26)

Dietrick. Before we get too far away from the subject, should not some definite action be taken on the question raised in regard to the work in Haywood County?

Schaub. Do you mean with reference to that report? What is your desire in that matter?

Dietrick. For the consideration of the group, I move that it be reviewed and necessary revisions made, and published.

Schaub. The motion was to review and complete the report and to arrange for it either to be printed, or at least duplicated, so that it would be available for general use.

Davis. I second it.

The motion was agreed to.

Schaub. Mr. Secretary, you can follow through on that.

Standing Committees

(Appendix, p. 79)

Schaub. The next thing on the agenda is the report of the Committee on Plant Facilities and Products.

Clayton. I do not think we should go to that yet, Dean. On this item of standing committees here, we undertook to try to block out, in the light of our current information, the fields of activities of these standing committees. These allocations have been set up purely as a preliminary thing and for current

^{1/} PRELIMINARY CLASSIFICATION OF MAJOR PROJECTS AND ACTIVITIES IN THE TENNESSEE VALLEY UNDER THE TVA ACT, 1949. Tennessee Valley Agricultural Correlating Committee, Unnumbered Publication, October 1949. Knoxville, Tennessee.

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Clayton. guidance. We will include in the proceedings those categories of activities which have been assigned to the different committees. Isn't that right Mac (Mr. McAmis), isn't that what this amounts to?

McAmis. Tentative assignment.

Clayton. It is purely tentative, and the mere fact that a particular subject matter is assigned to one committee does not preclude action by another committee in the same field. There may be close relationships between them. In this we are trying to assist ourselves in clarifying this matter of assignments and to assist the committees in orienting themselves to the job. I think I might say that not all of these categories will necessarily be used, but should a question arise, they will serve as a guide in routing the question to the appropriate committee.

Committee on Plant Facilities and Products (appendix, p. 80)

Committee on Water and Land Use (appendix, p. 80)

Committee on Rural Facilities, Services, and Industry (appendix, p. 83)

Proposed Regional Film on Land Use

(Appendix, p. 84)

Brown I bring for Walter Brown to the group, this report.
(H. L.)

Director Harry L. Brown then read the following statement:

Since the last statement was made to the Conference concerning the regional movie on land use being produced jointly by our institutions and TVA, the following developments have taken place:

Since the meeting on June 18, 1949, on which a report was made to the last Conference (Proc. XXXII, October 5, 1949, p. 3), each director has named a committee from his State to work with the executive committee on the film. From suggestions by these committees, a first draft of the picture was prepared and reviewed both by the directors and their committees. Suggested changes were rather comprehensive and pretty much in accord, indicating very similar trends of thought among the various staffs.

A skeleton treatment for the film was then made by the executive committee. This treatment, together with the more detailed first draft, was submitted to the Southern Educational Film Production Service² as a basis for drawing

² See appendix, footnote 5, p. 84.

REGIONAL FILM ON LAND USE

up an agreement to produce the picture. Difficulty in legally handling this joint project has made it necessary to draw up a contract, which is now being submitted to the various parties for signature.

Briefly, the contract provides for the following, as specified in the agreement between the executive committee and the film service:

The film service is to produce a color-sound picture two to three reels in length and deliver one print to each participating institution and agency, a total of 10 prints, for a total cost of \$15,000.

This leaves a balance of \$3,000 to be expended for posters, descriptive summation leaflets, slides, and news-story photographs to be used in making a rounded out program of visual teaching as agreed upon. According to the agreement, the film service is to prepare a script to be submitted by April 1. This script will be subject to review by the executive committee and by the State film committees.

Some of the winter scenes are already being photographed, particularly those showing winter pastures and bare and covered fields. These scenes, of course, will be fitted into the final script. Shooting is to be completed by October 1, and the final answer print is to be ready by December 15.

The executive committee realizes that the schedule set up is too brief perhaps to do the best possible job, but feels from its contacts with the institutions and their committees that it is necessary to get the picture finished for use in 1951.

Payments will be made to the film service as follows:

- \$2,500 concurrently with the execution of the agreement.
- \$5,000 upon acceptance of shooting script by the executive committee.
- \$3,500 upon submission of the rough-cut of picture.
- \$3,000 upon delivery of final answer print.
- \$1,000 upon delivery of one print to each of the participating agencies.

The comptroller of the University of Georgia has been designated as depository of the funds, to be disbursed upon direction of the executive committee. There is now in our treasury a total of \$10,933 already paid in.

From this report, it would appear that the committee is going forward with the projection of our agreed-on plan.

In Georgia, we feel that in order to get the best use of this comprehensive visual material on land use, we must prepare to make it a part of our official plan of work for 1951.

In addition to whatever plans we in the various participating States make for using this material, the executive committee also feels that it would be helpful to all of us to have a central committee, perhaps made up from

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our extension editors, to deal with the publicity and the preparation of news and magazine stories throughout the year to supplement and round out our teaching program as we use the motion picture and slides.

The executive committee has also asked me to express to you its appreciation for the vast amounts of time, the help, and the splendid cooperation given to planning this picture by your various State committees. These committees will, as has been mentioned, have opportunity to review the final script, which review will, of course, be necessarily brief because of the limitations of time.

Of course, we do not propose to adjust our 1951 Plan of Work to this picture, but we do think we can very effectively harness this picture and these pamphlets and some slide talks to our Plan of Work. Every year we are concerned about and work on land use problems. In every county, at all times, it is our job to keep people, both rural and urban, informed as to their relation to soil, and the adjustments needed for the best use of our resources in the interest of all. We believe this picture, with the accompanying aids, will help us do this more effectively, and it will coordinate our educational programs in all the counties, not only with each other but also with you other States in the region.

Schaub. Any questions? Mr. Landess has been tied in with that all the time. I thought if there were any further questions that might come up, we would call on him.

Landess. I'd like to ask a question myself. Where is that contract now? It started with Director Davis.

Weaver. It was mailed to Director Watkins, of South Carolina, sometime ago.

Landess. This delay is crowding us for time. We tried to avoid the contract idea, but our attorneys said they couldn't legally authorize expenditures by TVA unless it was a legal contract and that the agreement we had signed was only binding on the executive committee.

It is going to be a very difficult job--we have found that out now--to take any script writer who knows the techniques of picture dramatization and teach him enough of land use to interpret it into the script we are willing to accept. I am just telling you as a group the job we are trying to do. It may be, Mac (Mr. McAmis), I'd rather we delayed even more than to bring out a picture that we did not have time to submit to your committees for suggestions and approval. I do not want anything we are not all satisfied with. If we rush it too much, with these other delays, I am afraid we will not get what we want.

Schaub. Are there any States other than South Carolina in on it that are not in the Valley?

Landess. No. The Valley and South Carolina.

FARM INCOME

Schaub. Any further questions with reference to that?

Olson. I should like to point out, Dean Schaub, the process of making this picture after the script has been approved, in the shooting stage, might be a little slow, too, because the film service, last week, signed a contract with Columbia University to make a picture, sponsored by them, a \$27,000 picture, and it is finishing up some other work in Virginia, North Carolina, and several other States. The film service has an anhydrous ammonia picture coming up in Mississippi, and we imagine this executive committee is going to have to keep right up with the staff to get this job done in the specified length of time. If we don't, we will wind up here six months or a year late. The problem of additions to the staff is a very serious one because we don't know what the volume will be in the long-time future. As you know, it is a nonprofit organization, and the board of directors of that film service moves rather cautiously in expanding, with additional overhead.

Landess. It may be necessary to let our contract to someone better trained in agricultural pictures.

Schaub. Any further discussion?

ADDITIONAL PROPOSALS AND RECOMMENDATIONS

Conference on the Measurement of County Income

(Appendix, p. 86)

McAmis. As I understood this, it is a study of farm income; of course, other sources of income in a county are a part of it. That is correct, is it not?

Clayton. Yes.

Schaub. It covers all income?

Clayton. All income. That is right.

McAmis. This committee wants the help of this group in working on farm income. Otherwise, their study won't be complete.

Schaub. Perhaps if I read this letter from Chairman Martin, of the conference, to Dean Cooper, that may bring it out (appendix, p. 89). I take it from that letter they are asking for further cooperation.

Dietrick. Dean, why weren't some agricultural people put on this committee, if they want the agricultural end of it included?

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McAmis. That is exactly what they are trying to do now--get the authoritative contacts on information of that kind. It seemed to the Correlating Committee that the committee of which Dr. H. N. Young is a member had the people on it who could advise and contact the right people in the agricultural colleges, and in the Department, too. In other words, that is exactly what they are trying to make up out of this process.

Schaub. Their study has covered total income. Evidently after they moved along they found out that they weren't in a position to get the agricultural phase of it.

Young. In some of these counties, the agricultural phase is the most important as a source of income.

Gaston. Dean, does this study embrace the entire southeastern area or just the Tennessee River Basin?

Schaub. I take it the whole Southeast, because it goes as far as Virginia. No, I believe it says just the Valley.

Clayton. In each of the counties of the Tennessee Valley States, so it is broader than the Valley.

Schaub. Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, Virginia, and the Tennessee Valley Authority.

McAmis. Dr. Martin, of the University of Kentucky, met with the Correlating Committee at Lexington the last time, and there was a pretty thorough discussion of what their purposes were and the need and all, and how they would like to operate this. There did not seem to be any question on the part of any member of the Correlating Committee as to the desirability of doing it, and this committee of the Conference seemed to be the proper channel through which to make that contact.

Schaub. Do you approve the request?

Young. Dean, for an estimate of the farm income, we must use existing records. I think they have available those same existing records that we do. I assume that will mean that we will do the work by using existing records. Is that what they want us to do? We are not going out and do any original research beyond what we are doing already. They have available all our original research, they have available all the technical reports the same as we do. I wonder what they want us to do. Are we going to have a meeting with them?

McAmis. Yes, a meeting of representatives of that committee, with your committee, Dr. Young, before anything is done. That is what was proposed. Either one way or the other--a representative of your committee will meet with them or a representative of their

FARM INCOME

McAmis. committee will meet with you, or the two committees may meet jointly.

Young. Who will take the initiative?

McAmis. I think they will. My understanding is that they would meet with you.

Young. We need some kind of a joint meeting before we can give any answers. I do not think this group can take any action until we meet.

Schaub. It seems to me all this group could do would be to approve the general idea as to whether it is advisable or worth-while and then leave it up to your committee as to what final action should be taken.

Young. So far as I am concerned, I would like to meet with them. Whether or not we will do a lot of work they can do, because they have available the same records as we do, is a question to be decided at the meeting.

Brown. Mr. Chairman, I move that this matter be referred to Dr. Young's committee, with power to act.
(H. L.)

Gaston. Second.

The motion was agreed to.

Next Meeting of Conference

(Appendix, p. 90)

The Conference agreed to hold its next meeting in Roanoke, Virginia, on Wednesday, October 4, 1950.

REPORT OF COMMITTEE ON PLANT FACILITIES AND PRODUCTS

(Appendix, p. 91)

DISCUSSION

In the absence of C. H. Young, Chairman of the Committee on Plant Facilities and Products, Mr. John H. Walthall presented the report of that committee to the Conference.

Schaub. Any questions or discussion?

Brown. Mr. Chairman, it has been so long since I have had the privilege
(H. L.) to meet with this group that I know I am wholly unaware of

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Brown. developments in recent years. The nature of that report brought (H. L.) to my mind some questions which I would like to ask, if it is not out of place. The first thing has to do with the distribution of trees from the Tennessee Valley Authority's nurseries. I notice that those are being distributed through the state foresters. I have no fault to find with that except that I raise the question whether or not, with that method of distribution, farm wood lots owned by farmers will get their share of those trees that might be their proper share. In Georgia, for instance (this wouldn't hold true for the Valley counties but for the whole State), more than 50 percent of the forest area is in farms. Of the cash income, including forestry income, more than one-third, three and one-half million dollars; in other words, annually, is coming from the forests of the State. To us, it is quite important, therefore, and we feel that the forest enterprise on farms, as we look ahead, offers one of the most promising opportunities for supplementing income and taking care of the land. So I just raise the question as--first of all, I didn't quite understand, I guess, this organization that has taken place under these committees. Maybe the answer lies there. But I didn't quite understand why the forest activities come in with the chemical production facilities of the Tennessee Valley Authority.

Young. Mr. Chairman, we have quite a discussion of that very point in our report. (See appendix, p. 91.)

Walthall. I can answer part of that question, anyway. As I say, I am not a member of this committee, but I did attend the meeting of the committee, and there was considerable discussion about whether the forest nursery activities were properly a part of the work of this committee. I think, Dean Schaub, in reading the preliminary report of the committee, I pointed that out. As I understand it, it has not been definitely settled that the forest nursery activities will be a part of the work of this committee. That is up to the decision of the Correlating Committee or of this particular group here. The reason that it was included in this report was that the report is on plant facilities and products, and, insofar as TVA is concerned, the physical products that it makes and distributes consist entirely of chemical products and tree seedlings. It makes other things, too, such as electricity, but the physical things that it makes with which this committee is concerned are chemical products and tree seedlings, and it was considered for that reason, since this is a committee on plant facilities, that the nursery might be considered a plant facility.

Brown. I think that makes sense. I was just raising the question. (H. L.)

Walthall. As to the actual distribution of the tree seedlings, I am not too intimately connected with that particular phase of the Authority's activities. I expect there are others here who can answer that question better than I can. I can say this that my

FOREST TREE NURSERIES

Walthall. impression has been there has been no difficulty in farmers' getting trees if they want them, as is indicated by the fact that the capacity to produce seedlings is approximately twice what we are now producing. I should assume it to mean that the demand could easily be met. Do you care to add anything further to that, Mr. Bass?

Bass. I am wondering if it wouldn't be better to wait for Dr. Young's report on distribution. If the question should come up at that time, I am sure we would be glad to try to answer it.

Brown.
(H. L.) The greatest question, Mr. Chairman, in my mind, is that the method of distributing nursery stock departs from the plan and policy of the superintendents.

Bass. I might say this, in summary, that TVA's reasons for producing forest tree plant stock and limiting their distribution to the Tennessee Valley relate to the responsibilities for the watershed protection, and, in that respect, apparently, they do differ from the fertilizer for distribution in the Tennessee Valley watershed.

Crumpler. I should like to address a question to Mr. Bass on that matter of policy on distribution of trees. In the Production and Marketing Administration, through the conservation program, we have had an interest all along in the promotion of seeding of desirable woods, and we offer payments and assistance to farmers in that work. It has never had any great emphasis in our program, and the story we get when we inquire into it is that available trees are being used and there are no production facilities for expanded tree planting. During the war, the Department nurseries were somewhat curtailed. My question is this: Is the TVA policy toward restricting the distribution of their trees to the Valley States an ironclad policy which couldn't be loosened somewhat if there are additional facilities in the nurseries for the production of more trees, and is it possible if the production were increased to use them all in the Valley?

Bass. I realize my answer wasn't complete awhile ago. The basic justification for the distribution of trees without cost to farmers and for restricting such distribution to the Tennessee Valley is for the very good reason, I think, that it is associated with our responsibilities for protection of the watershed. However, we do now produce, as a service, for the cost of production, on a reimbursable basis, trees for use beyond the Valley. Of the seedlings that we now produce under contract for the Army Engineers, the Soil Conservation Service, and the Forest Service, many of them go outside the Valley. We have had some discussion and indicated our willingness to use any unused capacity in our nurseries as may be desired by PMA and other agencies for the production of seedlings for them at the cost of production. We would, however, give priority to the

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Bass. Tennessee Valley requirements as they are expressed through estimates made up, first, by the extension services for trees required for use on farms, plus the additional amount that State Forestry Department need for nonfarm areas.

While I am on my feet, I do want to say that this tree-planting program, from my point of view, is a very effective program for reaching the objectives that I mentioned awhile ago, in that trees are going on lands which really need them, in contrast to the usual planting of purchased trees on commercial timberlands for growth of pulpwood and other such uses. I don't mean to say that such uses aren't highly desirable, but we find that by furnishing the trees free through this collaborative process of identifying the lands on farms which should be planted to trees as a part of the farm enterprise, does produce the result of getting lands forested that are in serious need of it. I do not recall the exact statistics, and maybe Ike Olson can elaborate on it, but Alcorn County, in Mississippi, particularly, has carried on a reforestation program at a rate in which their total reforestation job can be completed in a matter of 3 or 4 years, as compared with a rate, generally through the Valley, which would complete replanting in something like 40 to 50 years. We hope the job can be shortened to 25 years. In another county in Mississippi, Tishomingo, landowners made an outstanding record in the Nation last year in reforestation. Would you like to add to that, Mr. Olson?

Olson. I would rather not, except to say that the farmers of that county are planting on that farm land around two million trees a year. About 90 percent of this is in the Valley. We are speeding up that program to the point where we think we will have that forestry job pretty much in hand in a few years. Those trees are distributed through the county agents.

Schaub. Does that county tie in with one of those flood control projects that they are working on, for the watershed?

Olson. No, Dean. You are thinking about one of the flood control projects over in central and west Mississippi.

Brown. (H. L.) Mr. Chairman, my concern may have no basis in fact. I just raise the question in relation to the objective that Neil (Mr. Bass) set forth here. The thing that I am interested in here is that these trees get on the land where they are most needed. I think if they are in the hands of folks who work with the commercial areas, the pulpwood areas, those big areas, they aren't going to get on the land where they are the most needed.

McReynolds. Dean, I think, in our case, we have three-way contract arrangements between TVA, the extension service, and the State Forestry Department through which, theoretically, the distribution of trees is with the State Forestry Department but which provide that the state forester may, which he has done,

FOREST TREE NURSERIES

McReynolds. designate the county agent in each county as his representative to accept applications and furnish information and practical educational work for the farmer as to where the trees should go, etc. In our case, applications for trees and plans for their distribution pass through the extension offices in the county and are, I think, handled with due regard to the development of farm woodlands. I just don't know of a case where trees are going into the Tennessee Valley portion of our State on a particularly extensive scale to an individual landowner, except in Wayne County.

Olson. I should like to make this final statement, Dean. This is something that we are proud of in Mississippi. According to the record of the forestry people, Tishomingo County, Mississippi, planted more trees in 1949 by farmers on farm woodland areas than any other county in the United States, not just in the Tennessee Valley, but in the whole country, and they will plant just about as many this year, according to the records. That is something we feel mighty good about. We are getting these old hillsides covered up with trees.

Bass. Mr. Crumpler asked me to make a brief reference to an arrangement that is in the process of being worked out, whereby additional TVA seedlings will be made available to farmers in the Valley under the PMA program. That is based on the experience in Lawrence County that Mr. McReynolds referred to. The committeemen there made a special study of the opportunity for reforestation of farm lands and recognized that there was a tremendous opportunity to improve woodland productivity on farms, starting, of course, with the availability of tree seedlings. They were anxious that in establishing practices to set a price which would encourage use of these trees and to be sure that farmers would know that seedlings were available and could be requisitioned and made a part of the PMA practice. Generally speaking--and I hope Mr. Crumpler will correct me if this is not accurate--PMA sets a practice for reforestation which pays the farmer at a rate to cover the cost of trees and give some incentive for planting. But in the Tennessee Valley, of course, these trees are available to farmers without cost, so PMA in the Valley is adjusting its practice to cover other aspects of reforestation, such as preparation for planting, labor involved, and other incidental but necessary work. We anticipate that estimates will be made of additional requirements for seedlings which will absorb some of the unused capacity of the nurseries. We felt sure that this development would be of interest to this group, since it is just being gotten under way and is stemming from the experience in Lawrence County, Tennessee, where this practice is being established for the reforestation program.

Gaston. Dean, I have a question that somewhat concerns me that I should like to ask about the nurseries. It may be answered in the report of the other committees. In view of the growing

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Gaston.

emphasis and success in connection with grasses and legumes and other forage plants, and the increased consideration of further changing of some of the land use, some of the land we have heretofore been using for row crops or other uses, are there any nurseries that spend their time on grass seed, production of plots of grass seed or other forage types of plants? It leads to the same end. Or is that problem being handled in another way?

Schaub.

I don't know of any. Does anyone know of any nurseries in that connection?

Crumpler.

Mr. Chairman, there is a program of promoting foundation stock seeds and improved varieties.

Gaston.

If we actually move forward in the direction that it looks as if we may have to move, with fewer and fewer acres of row crops, and also further toward that concept of watershed protection, and at the same time maintain our income, we will have to put a lot of emphasis on trees and forage crops, both.

Olson.

Would that further new crops?

Gaston.

I should have said new, or improved, or promising, things that are promising, that haven't yet got to the stage where they have got started. Those things usually have to get started by the commercial people.

McReynolds.

Isn't SCS doing some?

Gaston.

Yes, some, but I don't think enough is being done to meet the situations that we are facing in the mountains.

REPORT OF COMMITTEE ON WATER AND LAND USE

(Appendix, p. 113)

DISCUSSION

Farm Classification and AnalysisChance.

Joe Moon was there and contributed to the discussion in a very helpful manner; and I wonder, Mr. Moon, if you would be kind enough to give a little interpretation of what your thinking at this meeting was and also cover any point that I may have left out in the summary.

Moon.

I took the position then that I hold now. As long as we agriculturists are content to work only as specialists, on specific phases of agriculture, I think we could get along

FARM CLASSIFICATION AND ANALYSIS

Moon.

pretty well without a farm classification; that is, if all of our work were concerned with specialties in horticulture, in engineering, and specialties of other sorts, I do not think we would need to get too much concerned about farm classification. Even then I think we would need farm classification in programming, in identifying critical situations and critical areas; but if our interests were limited to specialties, farm classification would not be so urgent.

On the other hand, since our work has become concerned with farms as units, of which test-demonstration work and research pilot farms are good examples, when we begin to emphasize farm work of this sort, I don't think, myself, that we can get very far without a classification of farms. As a matter of fact, I expect that most of the people who are working with farm units have some sort of classification of farms in mind. As I have said before, my own thinking is that we have quite a bit to learn about farm classification. Quite a bit of work has been done already, but I don't know that I would say a lot, as compared with classificational work along other lines.

In farm classification and analysis, we have a big job. We will never get through with the analysis phase. Farm analysis will continue as long as we have science in agriculture. As referred to this morning, I think it will call for a lot of work to develop a practical scheme of farm classification. I think we need to sit down around the table and settle on some procedure, that is, if we plan to classify farms. I think we will have to develop a procedure and classify our farms if we expect to deal with them as units. I think it is necessary to classify farms for reasons similar to those for placing students of your universities into classes. The purposes are similar in both cases. To make a more general statement, I think when we have a great number of objects to work with, a great number, we simply have to classify them and put similar objects together in categories in order to deal with them effectively and logically. That is my own idea. A lot of people probably see it differently.

When we begin to think about classifying farms, soils, plants, or anything else, one of the first problems we meet is that of deciding what characteristics we are going to take into consideration as the basis for the classification; that is, according to what features of the objects are we going to classify them. We could classify farms according to types of farming only; or we could try to classify farms according to a great number of farm characteristics. When we begin to decide what we are going to include in the basis of the classification, it is very important that we keep clearly in mind just what use we plan to make of the classification. Of course we also have to give thorough consideration to the degree of detail or the degree of complexity that will be

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Moon. involved. We must make every effort to keep the job as simple as possible, certainly in the initial stages.

I am, personally, of the opinion that we should classify our farms on the basis of relatively permanent physical resources. This just about means soils--kinds of soils, patterns of soils, and amount--or soils and size of farms. It would be difficult enough to do the job this way. I favor this approach, not only because it is relatively simple, but also because it is the logical way to do it. If we classify these farms on the basis of their relatively permanent physical resources, then we are not getting into the basis of our classification purely transient, changeable economic and social factors. To put it another way: We want to take what we have in the way of physical farms--physical resources--and see what we can do with the physical farm by applying alternative economic systems of management. Then through processes of analysis and experimentation work out predictions of what may be reasonably expected in the way of production from any one of a class of physical farms under each of the physically defined systems of management. We are working with this now in the Chestee area in Tennessee to see what we can do with it. I think we can do a pretty good job of it, but our most difficult problem is the soil question; that is, the job of defining the range in soil combinations that will be allowed in a class of farms. This is a very difficult thing to do. I think perhaps that some of you here will be interested in our outcome. Incidentally, I think that Dr. Osgood is making a very good effort to classify farms in northern Mississippi, and I think he is getting good results.

For additional comments of Mr. Moon on this subject, see p. 24.

Watershed and Area Studies

Chance. The committee went on record in the form of a motion. I will read the motion to you:

Move that this committee recommend the initiation of more watershed studies similar in design and purpose to the subproject entitled, "Effect of Type of Vegetation and Pasture Management on Water Conservation and Utilization in the Mountain Area of North Carolina,"

--

(I might say now that Mr. Moon brought out, just a minute ago, something of that nature in connection with the Middle Creek section of the Chestee area.)

in order to determine the facts of the interrelationships of optimum land and water use under various important conditions of soil and cover.

HARRY A. CURTIS

Brown. (H. L.) I shall have to leave immediately after luncheon to return to Georgia, but I wish to state that I am strongly in favor of the suggestions that have been made as to the use of nitrogen to get cover on the land. We have found, even with this cover, that applications of nitrogen not only increase the effectiveness of the cover but also make greater the possibility of increasing the income for those farmers who use the land that way. I just want, before I leave, to express my opinion about that program, since it seems to be in the offing.

LUNCHEON

The Conference recessed for lunch at 12:10 p.m. At the luncheon session, Dr. Harry A. Curtis, member of the Board of Directors of the Tennessee Valley Authority, addressed the Conference. Dr. Curtis' statement appears in the appendix, p. 125.

The Conference reconvened at 2:05 p.m.

REPORT OF COMMITTEE ON RURAL FACILITIES
SERVICES, AND INDUSTRY

(Appendix, p. 133)

DISCUSSION

In the absence of Dr. R. E. McArdle, chairman of the committee, Dr. H. N. Young presented the report of the Committee on Rural Facilities, Services, and Industry.

Transportation

Clayton. I wish to thank Director Young for an excellent summary of a very long report. I should like to add to his comments this: Among the statements made to the committee on various aspects of the work, none struck me more forcibly than the statement made by Mr. A. J. Wagner on development of the Tennessee River waterway in relation to agriculture in the Tennessee Valley. This fact that we have, since TVA was set up, the establishment of an inland waterway extending more than 600 miles from Knoxville to the Ohio River and the potentialities of that for the farm people in the Tennessee Valley, is something that challenges the imagination. Yet it is a subject that, up to this time, I do not recall ever having been mentioned in these conferences; so I have been exceedingly happy to see this committee address itself to that question. Even in this brief statement, Mr. Wagner brought out some points as to the bearing of this channel of transportation on agriculture that, to me, were revealing. I think it was his feeling, and certainly he

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Clayton. left me with the feeling, that those potentialities have scarcely been tapped. So there is a field of exploration--a resource that we have here that has, possibly, vital importance to agriculture in the Southeast--which, I hope, will engage our attention in the future much more than has been true in the past. Also, as was pointed out by Director Young in his statement, it isn't merely a question of 600 miles of channel between Knoxville and Paducah, but of a system that ties into the vast inland waterway systems of the Mississippi River and its tributaries and into all the volumes of transportation that are offered there. I just wanted to take a minute to invite your attention to the fact that we do have a preliminary report on this, and, if you can possibly spare the time to do so, I hope that you will read Mr. Wagner's statement. It certainly is well worth reading.

Reforestation

Davis. Mr. Chairman, may I make one comment? On this reforestation, I don't believe anybody has called attention to the fact that it takes about 1000 seedlings to plant one acre, and when you divide by a thousand, you get your acreage figure down very low. In Alabama, in the last figures I had, the total production of seedlings was on the basis of 20 million a year from all sources, including TVA. That would plant 20,000 acres a year. That is a little more than 300 acres per year per county. That is all seedlings, so we are not going to accomplish a lot in artificial reforestation at that rate. If we are going to do much of it, we are going to have to get a lot more seedlings. You take the new paper mill at Childersburg. It is consuming wood at the rate of 400,000 acres of growth per year. Now, when we look at that and see that that is just one of many wood-consuming industries, then I think that we will have to do one of two things. We will either have to get a lot more seedlings or we will have to spend a lot more on natural reforestation. We may just be kidding ourselves and piddling in forestry when we ought to be doing something really big.

Young. Is it true, throughout a large part of the South, that the trees come in naturally, if we have enough protection of seed trees? Natural restocking is much more important than artificial reforestation will ever be.

Schaub. In a conference a short time ago with the forestry people, in reference to it, they were very pessimistic as to the ability to increase the number of seedlings very rapidly, and the key to the problem is getting the seeds. They say they are planting now all the seeds that they can get, and they are having to pay some fancy prices for certain species, since they cannot get enough seeds to increase the plantings in line even with the demand.

WINTER COVER AND SEED PRODUCTION PROGRAM

Davis. Dean, I think we may need some research on how to speed up natural reforestation.

Chance. There is a factor entering into natural reforestation that I am afraid we may overlook, that is, the better species are giving way to weed trees. There needs to be considerable education on seeding the better species so that you will get reforestation of the type of timber that you want. We have lots of timberland that is just a bunch of weeds.

Moore. Isn't it true that your weed trees grow faster than the other?

Chance. That is right.

Schaub. Any further discussion of this report?

Davis. I move that it be approved.

Jones.
(L. I.) Second the motion.

Schaub. The others haven't been approved.

Davis. Let it cover all of them.

Schaub. Without objection, we will take that action.

OTHER BUSINESS

Schaub. Mr. Bass, haven't you something in reference to the winter cover and seed production program that you want to take up?

Bass. As Mr. Walthall stated this morning, the TVA plant is a research plant in the first instance and, as such, it is a public plant in terms of being devoted to bringing about those changes in agriculture that are desirable in the public interest. Of course, phosphate, by its nature, is a basic and key element in bringing about those changes in agriculture that are generally deemed to be in the public interest. As Dr. Curtis pointed out at his talk during lunch, it is the key element in helping to make possible that type of agriculture in the region that combines the desirable agriculture objectives and watershed protection and water control objectives. As Mr. Walthall pointed out this morning, we were projected into the large-scale production of nitrogen during the war, first, for explosives, and then as the situation changed, to fill an equally vital need for the production of agricultural products.

Since the war and up until the current year, there have been tremendous demands for nitrogen fertilizer for what we look upon as ordinary production objectives. During this period we have gained experience in the region as a result of your research

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Bass.

and the development of farming systems on the test-demonstration farms, to show, particularly, the opportunities here for what might be broadly referred to as a pasture agriculture. There has been a perfectly amazing revolution in farming systems in that regard. The work at the Belle Mina Station is an amazing demonstration of the amount of grazing and forage that can be produced per acre of farm land. Of course, one of the dominant influences in how rapidly shifts take place toward a winter pasture agriculture is the extent of use of minerals in such an agriculture.

This marvelous work in establishing in this region the "know-how" of winter covers has led the TVA Board to express the hope that we might rapidly move to the point in which the products of the TVA plant should be directed more intensively for use in this desirable public objective of more widespread winter cover, and the use of the cover for livestock grazing. Beginning this July, the TVA Board approved the inauguration of what we have looked upon as a rather large-scale and exciting test of whether we might not put the product of this plant to giving an effective push to that program. Specifically, they have approved the setting aside of 25,000 tons of ammonium nitrate for use in the Valley at a discount below the market price, provided the agencies who are concerned with agricultural uses wish to get together on this program and enlist the cooperation of the farmers of the Valley and really conduct a test this fall and winter as to whether this amount of nitrogen, and more if necessary, could be put into a vigorous winter-cover and seed-production program.

As you know, the TVA staff is in the midst of holding discussions with colleges, PMA, cooperatives, and others concerned. I don't believe that in a single instance any agency concerned hasn't said that this is the very thing they wanted to do and that they are glad that TVA is taking this positive step with respect to this block of material.

Mr. McAmis, I don't know of anything more I might add at this stage, and I hope you will further elaborate on the proposal.

McAmis.

I think we ought to look on this not as something new but rather as a return to the kind of work and the use we were making of this plant before the war came on. There are some differences. At that time, we had phosphates. This time we have nitrates also. There is another little difference, a rather important difference. When this work with phosphates began, we did not have cooperatives in the field, very effective ones at least, to aid and to handle the material. Now, we do have such organizations, and this plan, if it can be worked out, contemplates the use of those organizations as a machinery for the distribution of ammonium nitrate, for selected uses, at a discount. I think it offers a very great opportunity to set the plant and its production in the program of agriculture in the

WINTER COVER AND SEED PRODUCTION PROGRAM

McAmis.

region, the program of watershed protection, and to set the plant products into the national picture as a means of agricultural adjustment.

We had a conference with PMA people in Washington about a week or so ago, and they have, or will, in the next day or two, issue a statement to the State offices, outlining their willingness to cooperate in this step and hope that a program can be set up which will bring in the support and cooperation of all the agencies in the Valley who have an interest in that. A copy of that memorandum to field offices will no doubt reach you this week. That, again, follows the pattern which was followed in the phosphate matter in 1937 when the phosphate production of our plants was really transferred, in that case, to the old AAA, and which, so far as I know, worked very, very well.

The next step on this, it seems to us, is to work out the practices within the States, the Valley parts of the several States, which would be agriculturally sound, which would best serve the interest of the watershed protection in the Valley, and which would be, at the same time, in the interest of desirable agricultural adjustments, not only from the standpoint of the local area, but from the standpoint of the region and the Nation as well. In three of the States, beginning in Tennessee, in Alabama, and in Mississippi, committees have already been organized, made up of representatives of the institutions, of the cooperatives now distributing TVA fertilizers within that area of the State, and of the TVA and the PMA. Those committees, it seemed to us, are the ideal machinery to work out the selective uses to which this nitrogen fertilizer ought to be put. Those committees have scheduled meetings that have been worked out more or less tentatively, something like this: On May 29 at Chattanooga, for Georgia; on the 31st in Nashville, and then on the first of June at Abingdon, Virginia; then beginning on the 2nd, at Asheville. On the following Monday, P. O. (Director Davis), in Alabama; the following day, Tuesday, in Kentucky. The reason that schedule was worked out was because that would give an opportunity for the field representatives of PMA to attend.

These communities will have the job of working out what practices are sound with respect to agriculture of those several States and then procedures by which they will get the material distributed and used, with ways of checking and analyzing results. As you all know, this nitrogen isn't going to be as easy to follow as the lime or phosphate, but the PMA has said that they would be glad, as far as it is desired to do so, to have the machinery of the PMA utilized in checking compliance in the regular way that is done now with phosphates under the PMA program and also in aiding in analyzing the overall results of its use.

I think those are some of the questions which need to be worked out. For example, we have been thinking it would be entirely

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McAmis.

possible, if it is agreeable within the States that are concerned with it, simply to have a purchase order in effect which would go to the cooperative and would, at that point, be discounted 25 percent, and then the TVA would settle the discount with the cooperative. There are some other questions, as you know. PMA has had a policy of establishing fair prices. That is done, as I understand it, pretty much through the local county committees. The PMA county committees would not be in a position to establish a fair price, but they would be in a position, since they have the machinery in local counties, to aid in recommending a fair price. We feel that the user, the farmer, ought to get the benefit of this 25 percent reduction. We also feel that if this succeeds, as we think it will succeed, the volume created for the cooperative ought to enable the cooperative to reduce its margin somewhat. To me, this proposal has some very large aspects which I should like to mention briefly, and then I should like to hear some discussion. There is the possibility of taking more advantage of our winter rainfall and our mild winter temperatures, as has been shown by experiment stations in Alabama, Tennessee, and in other southern areas.

There is the problem of getting an adequate supply of the right kind of planting seed. If it were possible to utilize this nitrogen, not alone, but with whatever needs to be used with it, to expand this supply of seed, it seems to me it would be very worth while. Some rough calculations have been made of the seed acreage that would be required if the farmers in the Tennessee Valley made as great use of certain seed as the test-demonstration farmers have made. On this basis, the seed acreage required for that purpose would approach the amount of land which is to be taken out of basic crops in the Tennessee Valley and would take about 10,000 tons more of ammonium nitrate than has now been allocated to the Valley. Danger of a slump in the market isn't going to be very great because most of these seeds can be stored from year to year for use by the grower.

Moore.

I don't believe you are going to get the small ones to go to seed. The market is going to make the demand for what it is. Any man who takes seed and handles seed right has got to have a business that is big enough to justify the expenditures of taking care of that seed.

McAmis.

On the livestock side, we have noted the seasonal variations in market supplies of livestock and livestock products. There is twice as much milk produced in June in the Valley as there is in January, and, of course, you know what the consequences are. The manufacturers have expressed a very great interest in leveling out the market. On the livestock side, there are about four times as many cattle that move into the Knoxville-Nashville-Chattanooga markets in October as in May. That is not best from the standpoint of the packer. Thus the consumer, the processor, as well as the producer, has an interest in how this proposed use of nitrogen can level out seasonally the supply of

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McAmis.

livestock and livestock products. The adjustment of supply is a very important one, particularly when we consider that most of the product of the land is going to livestock.

I'd like to hear some discussion of that, Dean Schaub.

Jones.
(L. I.)

Dean (Dean Schaub), I can't quite subscribe to the theory that our grass seeds might be our limiting factor. I think we have potential seedings of grass, clover, and alfalfa, if we would harvest the seed to take care of our needs. We started the Mississippi 1950 pasture year. We asked the agricultural workers if they would adopt it into a resolution and spread it over a 10-year period 50 to 60 decades of pasture building. Well, they chewed it over in the resolutions committee and chewed it up and gave it the Mother Hubbard type of resolution that didn't mean very much. Seven states have already adopted pasture building as a major phase of their work for the next 10 years. It isn't so much a matter of lack of seeds as it is lack of energy and mineralization of the seedings that we already have. This matter was presented to the Secretary of Agriculture, and he liked it very much. We are never going to get seeds until we start a program of production. In the United States, we have been requested to take out about half a million acres in crops. Our statistician the other day said that our outlook guide showed an 8 percent increase in corn acreage, 7 percent increase in hay, 15 percent increase in sweet potatoes, 30 percent increase in soybeans, and 35 percent increase in oats, approximately that, amounting to 425 thousand acres; with about 100- to 150,000 acres of new pasture put in this year runs it to about 550,000 acres of new crops, of additional crops that we haven't had. We use all the lime we can get and then the county has already run out of money. The PMA program put out more lime than it has ever put out. I think it is a matter of mineralizing the patches we already have and taking care of the seeds we have. We will have enough seeds to go to waste this year in Mississippi in clovers and grass, with lower pasture acreage than we need.

Moore.

You will make that grass more palatable, you will add more protein to that grass.

McLeod.

Mac (Mr. McAmis), I have no objection to your digest. Here is what I am wondering about phosphate. We have been saying that if we have the phosphate, we will get the nitrogen from legumes. I wonder what the people are going to say now when we come back and reverse our stand on that.

McAmis.

Are you reversing?

McLeod.

I am not making any objection to your program. I am just talking about what is going to be our procedure when we go out there and visit these people. Are we going to tell them we were wrong, or what are we going to do?

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Davis. I believe we are just adding nitrogen to the foundation on which we are working out these adjustments.

Schaub. Haven't you reversed yourselves about three times in the last 15 years?

Crumpler. Essentially, I am in no way an agronomist or an expert on either fertilizer or seeds, but one thing that I have observed is that the principal seed supply that the people in the South use, and in our experience farmers buy large quantities of these seeds, is still coming from the Pacific Northwest. There is very little production except in crimson clover, orchard grass, and fescue in this area of the country. The West is still producing, Texas and Oklahoma, but by and large the commercial production of such grasses and legumes is still coming out of the Pacific Northwest. As to nitrogen, I think in moving this material for the purpose you have in mind--I am not fussing with the purpose--I think there is a tremendous amount of educational work to do. I, as well as the other gentlemen who have spoken, have learned that by the use of phosphate, lime, and potash, the legumes get all the nitrogen they need. Somebody is going to have to overcome that objection in the minds of the layman. Then, too, I don't know of any information on the part of the farmers, as represented by the FMA committees, for the use of nitrogen in a conservation program of the size that we have sponsored. There is very little sentiment among our States for the use of nitrogen, at least insisted upon, in the conservation program. I don't think it is going to be a matter of FMA checking the use of it. You have to get it out there. I believe among the people here are the folks who are going to have to promote and encourage the use of it. You have to sell them something first in the sense of getting it across to them that it has benefits.

Davis. As I see it--I have listened to this and have listened to what Neal (Mr. Bass) and Mac (Mr. McAmis) and all of them said--our phosphate program has gone along very successfully. It was felt, I think, back yonder that we could use enough phosphate or minerals and not use any nitrogen, but I believe experience has revealed that as we use more minerals, we also use more nitrogen. Am I right in that, Mr. Reaves?

Reaves. That checks with our records.

Davis. As to the seed, I do not believe we have any example of any big agricultural industry being established in an area when seed has to be imported from 2000 miles, say. Certainly if we have that situation, it would be a handicap. The seed factor is your limiting factor in this program that we have developed. My thinking is this that we ought to get hold of this nitrogen and fit it into the major objectives of this cooperative program, just the same as we did with phosphate, tie the two together and carry the program forward on this basis.

WINTER COVER AND SEED PRODUCTION PROGRAM

McAmis.

I want to make it very clear that if this material, this ammonium nitrate, isn't needed and cannot be successfully and soundly used, there is no disposition whatsoever on the part of TVA to continue to produce it.

Davis.

It can be, Mac. There is that plant that has been converted into peacetime use. Personally, I can see several big and very basic opportunities for using this nitrogen. I think, Mr. Chairman, that we ought to get our technical boys into it and study it and then blueprint what we are going to do. Get it down in writing, so that we will all have a unified program in all these seven States.

Olson.

Mr. Chairman, I should like to ask two questions. First, I'd like to state that Mississippi was the only state out of twelve at the recent meeting in Birmingham where the state committees, PMA committees, had their meeting, that advocated nitrogen on certain crops. The chairman of our state committee was active in sponsoring such a program, because we think it is practical; we think it is needed. In Mississippi, so far as I know, nobody has ever thought that we didn't need nitrogen in our pasture program, so we don't think we're reversing any long-time program we have had there, we don't think we would be doing anything contrary to what we have been talking about all these years. The Mississippi delegation was the only part of that group, but the principal reason why they didn't want to use nitrogen was the fear of its misuse, not so much for its lack of need, but a good many of the committees were afraid the farmers wouldn't use it right, would not use phosphate right in all cases. I think one time our State stopped payment on phosphate for several months because they thought some of the folks were not using it right. I believe that is right, Director Jones. We think a practice like that is sound. I don't know whether we will get anywhere with it, since we are one out of twelve southeastern States with that kind of feeling about it, but that doesn't change our opinion. We think we need it and ought to have it.

Now, I have two questions. The first question is, Mac (Mr. McAmis), what you say applies to the Valley so far as this 25 percent differential is concerned. Out of the Valley, will there be any kind of priority established for the use on these winter-grazing crops of TVA's material by farmers outside the Valley?

McAmis.

Yes.

Olson.

Will you explain that?

McAmis.

To the extent, again, that we feel that nitrogen fertilizer can be used in these ways, priority will be given up to a point, but not as to price, to those farmers who do want to use it for these purposes. The discount stops at the Valley line.

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Davis. Now, Mac (Mr. McAmis), would there be an allocation per county or per state? Is that correct?

McAmis. To those areas where the priority will be given.

Davis. And the 25 percent would be merely an inducement to a farmer to reward him for making this extra effort.

McAmis. In the Valley.

Olson. That is in the Valley. I am thinking of the 27 tons that come from Mississippi out of the Valley.

McAmis. A priority will be placed there on that use. That is limited to the months of July 1 to November 1; certainly the discount is limited to that point. Whether this priority can be extended may be another question.

Olson. My second question is, suppose we had that practice approved in the 1951 handbook of PMA on the use of nitrogen for perennial grass: (As I understand it, the Washington office of PMA will not consider payment on any annual crops, but only on grasses such as fescue and grasses of that type, of which we don't have very many.) Would that tie in with the TVA Fertilizer policy? Could we establish some sort of a priority for the use of an allotment by PMA for that purpose ahead of the row crop use?

McAmis. Yes, the TVA would be willing for that.

Davis. Mac (Mr. McAmis), how many tons had you talked about allocating to this particular use in the Valley area?

McAmis. 25,000 tons.

Schaub. Are you going to put any limit on the amount per acre?

Reaves. That would be limited to state recommendation.

McAmis. That 25,000 tons can probably be increased, but there is a limit on it now.

Davis. That is the amount we could have. We could count on that amount. This approaching fall?

McAmis. This coming July 1.

Moore. Old seeding or new seeding?

McAmis. We aren't setting the details of the use of it, but this proposal is conditioned upon a program you can get together in the Valley.

Davis. The program ought to be uniform as to objectives but adapted to conditions in the State as recommended by the State people.

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McAmis. That is right. I would hope that after these committees met that statement could be prepared which would state the reasons for their decisions. I hope that could happen.

Olson. Mac, the big problem on the use of this material out of the Valley is the reaction of these row crop folks. These folks that use this nitrogen, we know, have fertilizer on row crops. If you give these other folks priority, naturally it is going to take it away from row crop folks.

McAmis. That is what I mean by a policy statement.

McLeod. This 25,000 tons won't amount to very much anyway.

Davis. Let me ask this. I didn't get your point about the row crops.

Olson. My point, P. O. (Director Davis), is that nearly all the 27,000 tons that come from Mississippi now, annually, are being used on row crops. Over half of that goes to the Mississippi Delta, where it is all used on row crops. Now, if we establish a program here that gives priority to the use of nitrogen on grasses, it has got to come from these row crops.

Davis. This wouldn't necessarily interfere with what is now being done, would it? Here is a thing that we ought not to overlook on this total farm program; that is that we have surpluses of certain row crops and it looks like we are going to continue to have. I don't think this nitrogen in this program of adjustment over here ought to go to add up more to the surpluses. We have got to have low-cost production, you understand, but there are some things in the overall farm program that don't exactly add together. I hope that we can use this for the kind of agriculture we are trying to get to, not one that piles up more surpluses.

Olson. You are talking about the identical thing that I am.

Dietrick. Aren't you still going to recommend that your State grow some row crops?

Davis. Sure, we are, but what I am saying is that I don't think we ought to take this nitrogen over here and produce more of these surplus crops. I am one that believes in a good price program, but I feel that we are not adjusting to the type of agriculture in this area that the stations recommend, that research recommends, and that the economy of the Nation dictates. We ought to adjust to those things.

McAmis. Not adjusting fast enough?

Olson. Director Davis, industry is rapidly reaching the point where they can pretty well supply all the nitrogen needs for these controlled crops. We do not need one agency of the United

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Olson. States Government making the material here to defeat the objectives of another agency.

Davis. All of us here know that the agronomy boys are going to be on the annual tour this year. They will be together for a week starting May 22, and then these meetings following; and it seems to me we ought to allow that group to bring down to writing this kind of program, if it is needed. I would say definitely it is clear to me this nitrogen is needed for the expansion and improvement of this cooperative program. If we all act on it by resolution, we ought to do that now and then start the boys to work to get it going.

Schaub. I would like to ask a question. Do the experiment stations have the data on increased yield or income that might be expected to accrue from this application of nitrogen?

Young. No.

Jones. We have a lot of data, Dean. To answer the question of do we have enough to meet all the requirements, we have several experiments in Mississippi, all over the State, directly related to this problem of winter grazing, and there is a definite angle to it from the standpoint of operations from that area, and I think, largely, this would be true in some of the other States, that unless we use chemical nitrogen in the winter-grazing program, we are foredoomed to failure throughout the southern States. It can't be done successfully on a large scale for using grasses mixed with the legumes unless you have the nitrogen there. We have a good bit of evidence that would support that statement without any question. It gets to be quite rapidly a question of economics of production and how far you can go in regard to rates with nitrogen application. That relates also to the matter of how far we can go in replacing our annual crops with perennials that will fit into the system and where nitrogen might be used there. We know that the costs of using oats as a winter-grazing crop are quite high, higher than they should be, and this matter of crops comes to the nitrogen fertilizer bill.

Schaub. I think that we have the data so far as winter-grazing with small grain is concerned, but I am not sure that we have anything on what we can expect from nitrogen on grass crops.

McAmis. Grazing. I don't want to argue this at this time. You have an awful lot of orchard grass stands now, in which there is no clover, that could be used for seed production. Seed production does not necessarily involve a grazing problem. There may be a combination.

Moore. Here is the thing, Mac (Mr. McAmis). This is something that happened in Tennessee the other day when a group of dairymen came, talking about the surpluses they had at certain times of the year, which is an economic problem with them on how to

WINTER COVER AND SEED PRODUCTION PROGRAM

Moore. operate to take care of these things. The use which I, personally, think that nitrogen can put into pasture is to improve the nutritional quality of poor milk by making growth come faster and making it more succulent so that the cows can eat more and get more protein from the grass.

Schaub. Do you get any more protein in your grass?

Moore. From faster growth? I believe so.

Schaub. The thing that bothers me more on this program right now, is going out on a mass program, getting all the farmers to use nitrogen on grass, even though it is at a 25 percent reduction in cost, without we have data to support our recommendation. We may have it, I don't know.

Chance. Mr. Chairman, so far as Tennessee is concerned, I think we can safely go out on that limb.

Schaub. Will you get the response in the winter time?

Chance. Yes.

Ewing. We have built up a few years' work on rates and dates of application of nitrogen on bluegrass and fescue on our program at the station. We also have some different rates and dates of application under irrigation on dairy pasture; the same thing with winter grazing work also.

Schaub. I am sure that you will get it in the summertime, but I am not sure about the wintertime.

Reaves. I am sure we will get it in Alabama, and we have been using nitrogen in the winter-grazing programs since the winter of 1943-1944. We have reports from some 2000 or 3000 farmers over a period of time on what they think about it.

Davis. Mr. Chairman, I move then that this group recognize this as a proper step to take, and we express appreciation to TVA for making it available, and that we ask our technical men to plan a wise procedure which will be uniform within State conditions and needs.

Young. Mr. Chairman, this matter of generalization about fertilizer for grasses is an extremely complicated thing. One thing, is the effect on yields, under varying applications, soil conditions, etc; the agronomic results. Another thing is the economic interpretation of fertilizer experiments; that hasn't been done very well yet. Very often we make agronomic experiments, and we put down five dollars' worth of fertilizer and get ten dollars' worth of product, and then think we have five dollars profit. It doesn't apply so much to pasture as to row crops. That thing needs a whole lot more study.

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Jones. I agree, Dr. Young, that we need a lot more study. It seems to me if we give consideration to the fact whether nitrogen has a place in the program--if it does, the matter of how much to put on may vary with every State. So far as the southern States are concerned, and it may apply to the northern States to a lesser degree, unless we have nitrogen in our winter grazing program, we will not have a winter grazing program. We demonstrated that conclusively. Isn't that right, Mr. Reaves, in your observations in Alabama?

Reaves. Yes, sir.

Jones. If that is true, it seems to me that it is definitely in line with objectives that Mac (Mr. McAmis) stated a moment ago. Our job is to get the winter pastures growing and producing and covering up the land. If nitrogen can make a contribution in doing that, this should undoubtedly be a part of our overall program.

Young. Do that if it pays. It is your business as a research man to find out if it pays.

Jones. What I was saying a moment ago, if you don't use it, you don't even go into the program, in the first place. It is a matter of how much does it pay. We know it pays.

Young. In that case, then, you are dealing in a margin of wide differences. In dealing with some other States, you will have a smaller difference.

Jones. That is right. That is the reason why I say you will have a fluctuation if you go to northern tier of the Valley States, I am sure, because the problem isn't quite as acute in many of those States.

Young. Whether or not to put superphosphate or complete fertilizer on any crop may just be a matter of a small difference, and the agronomic interpretation is not conclusive. If you carry it one step farther and put an economic interpretation on it, it may not pay. You may get contradictory recommendations if you do not carry the thing through in all the steps.

McAmis. It seems to me, in terms of what McLeod said, that the answer varies, depending on time and circumstances. Mac (Dean McLeod), in this recommendation which was made to our Board, we felt that nitrogen would have at least a temporary place. To my mind, it would be an awfully nice thing if we wouldn't need any nitrogen.

McLeod. I would feel more at ease about it if we were going to take this more on grass.

Davis. I will go you a step further on nitrogen. I wish we didn't have to buy any fertilizer at all.

WINTER COVER AND SEED PRODUCTION PROGRAM

Davis. Dr. Young mentioned that we need more information. Sure we do. I don't think we really know all about anything, do we? Mr. Chairman, I made a motion. I don't think anybody seconded it.

Olson. I'll second it.

Crumpler. Question.

Schaub. Are you ready for the question? State your motion again.

Davis. I will restate it. My motion is this that we recognize the importance of the use of nitrogen in the TVA cooperative program as has been explained by Mr. Bass and Mr. McAmis, that we express our appreciation to the Tennessee Valley Authority for this offer to make it available under the conditions Mr. McAmis stated, and that we ask our technical boys to prepare, in writing, a plan for using this in each State, keeping in mind the fact that each State will adjust within its own particular conditions.

By request, the reporter read the original motion made by Director Davis.

McLeod. P. O. (Director Davis), it is true that you need supervisors on that committee. You need agronomists on there also, and experiment station men.

Schaub. You aren't going to find any research people who are ready to give a blanket endorsement to the use of nitrogen in a pasture program. That is true in North Carolina. They do not recommend the use of nitrogen on legumes. They are willing to recommend nitrogen on this grass for seed production purposes. I think any resolution we make here is not going to influence their decision. I don't think you are going to have any group that is in a position to do what you want to do until after you have had this series of meetings. Then maybe you might call a committee together. Otherwise, I don't see that they can do it in advance.

Davis. If we don't take some action, what will you say, Mac (Mr. McAmis), when you get back to your Board?

McAmis. So far as I am concerned, I did not expect any. What I did expect was a general reaction and an agreement on a procedure to work out a program. If we can't work out a program, then there is none.

Davis. It seems to me, Mac (Mr. McAmis), you would need something to tell your Board. Mr. Chairman, I withdraw the motion.

Schaub. Any other business?

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Clayton. Yes. The understanding is then, Mac (Mr. McAmis), that you outlined here a schedule of meetings at which this thing will be further reviewed and discussed; and it is also your understanding, is it not, that this group concurs in that proposed schedule.

McAmis. That is right. To work this program out.

Davis. I don't know what will come up at the meetings, Mr. Chairman. We haven't committed ourselves to anything. We made no motion. We are all free to do as we darn please.

Schaub. Haven't you committed yourselves to TVA to go on with these meetings?

Davis. Yes.

Clayton. Did you in your statement, Mac (Mr. McAmis), make it clear as to the procedure in the setting up of these committees, the composition of the committees, and their function or the job they are to do?

McAmis. The only point that I didn't cover or try to cover was that these committees are made up, first, of representatives of the colleges; second, the cooperatives who are functioning in the Valley part of the area; third, PMA; and fourth, the TVA. There is one point I didn't state, that this wouldn't necessarily be the only problem of these committees. There may be other problems that will need to come up and be worked on by these committees.

Clayton. Are these committees to make recommendations as to the uses of this product?

McAmis. Yes, and work out the procedure.

Reaves. You are assuming that the committee will check with us?

McAmis. Absolutely. I hope you know enough now about what is coming up to instruct these people with respect to your research, experimental results, etc., so that they will have full benefit of all available data and information.

Clayton. Your understanding is, then, that there is concurrence in this procedure?

McAmis. That is right.

Schaub. Any other business?

Dietrick. Have any letters gone out from your office regarding these meetings?

McAmis. No. The committees haven't been set up except in three States.

The meeting adjourned at 4:15 p.m.

APPENDIX

TENNESSEE VALLEY AGRICULTURAL CORRELATING COMMITTEE

PROCEEDINGS
THIRTY-THIRD VALLEY-STATES CONFERENCEHotel Peabody, Memphis, Tennessee
Friday, May 12, 1950

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* * * * *

ROLL OF CONFERENCE^{1/}Alabama

Davis, P. O., Director, Agricultural Extension Service, Auburn
 Reaves, R. M., Assistant District Agent, Agricultural Extension Service,
 Athens

Georgia

Brown, Harry L., Dean, College of Agriculture, and Director, Agricultural
 Extension Service and Agricultural Experiment Station, Athens
 Murray, C. C., Associate Director, Agricultural Experiment Station, Experiment

Kentucky

None

1/ See text, p. 19.

VALLEY-STATES CONFERENCE

Mississippi

Jones, L. I., Director, Agricultural Extension Service, State College
 Jones, Randall J., Associate Director, Agricultural Experiment Station, State College
 Olson, L. A., State Contact Officer, State College

North Carolina

Schaub, I. O., Director, Agricultural Extension Service, Raleigh
 Weaver, D. S., Assistant Director, Agricultural Extension Service, Raleigh

Tennessee

Chance, Frank S., Vice Director, Agricultural Experiment Station, Knoxville
 Ewing, John A., Assistant Director, Agricultural Experiment Station, Knoxville
 McLeod, J. H., Dean, College of Agriculture, and Director, Agricultural Extension Service and Agricultural Experiment Station, Knoxville
 McReynolds, E. C., Associate Director, Agricultural Extension Service, and Coordinator of Cooperative Programs, College of Agriculture, Knoxville
 Moore, Robert W., Vice Director, Agricultural Extension Service, Knoxville

Virginia

Daughtrey, W. H., Administrative Assistant to the Director, Agricultural Extension Service, Blacksburg
 Dietrick, L. B., Director, Agricultural Extension Service, Blacksburg
 H. L. Dunton, Head, Agronomy Department, Blacksburg
 Young, H. N., Director, Agricultural Experiment Station, Blacksburg

Tennessee Valley Authority

Bass, Neil, Chief Conservation Engineer, Knoxville
 Curtis, Harry A., Director, Knoxville
 Landess, William M., Head, Education and Information Section, Division of Agricultural Relations, Knoxville
 McAmis, J. C., Office of Chief Conservation Engineer, Knoxville
 Moon, J. W., Assistant Director, Division of Agricultural Relations, Knoxville
 Walthall, John H., Chief, Research and Engineering Branch, Wilson Dam, Alabama

U. S. Department of Agriculture

Crumpler, Roland, Chief, Conservation Materials and Services Division, Production and Marketing Administration, Washington, D. C.
 Gaston, T. L., Assistant to the Chief, Soil Conservation Service, Washington, D. C.

PROGRAM

Correlating Committee

McAmis, J. C., representing Tennessee Valley Authority, Knoxville, Tennessee
 Clayton, C. F., Executive Secretary, Knoxville, Tennessee

PROGRAM^{2/}Morning Session

Opening of Conference Thomas Cooper, Chairman
 I. Report of Correlating Committee Thomas Cooper, Chairman
 II. Report of Committee on Plant Facilities and
 Products. Charles H. Young, Chairman

Luncheon

Arrangements have been made for a group luncheon, to begin at 12:15 p.m., at Hotel Peabody. At the luncheon, Dr. H. A. Curtis, member of the Board of Directors, Tennessee Valley Authority, will address the Conference.

Afternoon Session

III. Report of Committee on Water and Land Use. . Frank S. Chance, Chairman
 IV. Report of Committee on Rural Facilities,
 Services, and Industry R. E. McArdle, Chairman
 V. Other business
 VI. Adjournment of Conference

2/ See text, p. 19.

CORRELATING COMMITTEE

REPORT OF CORRELATING COMMITTEE^{3/}

by
 Thomas Cooper, Chairman^{4/}

PROGRESS REPORT

Agency Cooperation in the Tennessee ValleySpecial Advisory Committee

The Special Advisory Committee met with the Correlating Committee on November 29, 1949, in Room 201, Administration Building, U. S. Department of Agriculture, Washington, D. C.

The following persons were present:

S. W. Atkins, Bureau of Agricultural Economics, Care of University of Tennessee
 Neil Bass, Chief Conservation Engineer, Tennessee Valley Authority
 C. F. Clayton, Executive Secretary, Tennessee Valley Agricultural Correlating Committee
 Thomas P. Cooper, Dean, College of Agriculture, and Director, Agricultural Extension Service and Experiment Station, University of Kentucky
 P. O. Davis, Director, Agricultural Extension Service, Alabama Polytechnic Institute
 J. C. Dykes, Assistant Chief, Soil Conservation Service, U. S. Department of Agriculture
 George F. Gant, General Manager, Tennessee Valley Authority
 Knox T. Hutchinson, Assistant Secretary, U. S. Department of Agriculture
 Neil W. Johnson, Research Administrator, Agricultural Research Administration, U. S. Department of Agriculture
 J. C. McAmis, Office of Chief Conservation Engineer, Tennessee Valley Authority
 I. O. Schaub, Director, Agricultural Extension Service, North Carolina State College
 A. R. Spillers, Chief, Cooperative Forestry Management Division, Forest Service, U. S. Department of Agriculture
 Ralph R. Will, Office of the Secretary of Agriculture
 Stanley P. Williams, Office of the Secretary of Agriculture

3/ See text, p. 20.

4/ In the absence of Chairman Cooper, the report of the Correlating Committee was presented by Director I. O. Schaub.

RESEARCH WORK IN HAYWOOD COUNTY, NORTH CAROLINA

Report on work in Haywood County, North Carolina. Mr. Neil Johnson, Regional Project Leader, presented a statement of the results of the research work in Haywood County, including the recommendations reported to the Conference at its meeting on October 5, 1949. Following the discussion of the work in Haywood County, the committees considered these questions:

1. Does experience in this study show that we have a method by which Federal and State agencies can jointly determine the developments and adjustments needed on farms in an area, as a basis for a program of assistance to such farm people?

There was unanimous agreement that the answer to this question is yes.

2. Can these determinations, under the method used in Haywood County, North Carolina, be made with sufficient definiteness to assure that advice and assistance to farm people will be consistent, no matter what agency gives the advice or renders the assistance?

The viewpoint was that results obtained will provide a useful and needed guide but that agreement among the agencies on administrative procedures is also essential.

3. Can the results of such a study be obtained for a sufficiently large area and within a sufficiently short time to make the use of the method feasible for the formulating of the unified agricultural program in the Tennessee Valley?

Mr. Johnson estimated that the cost of the work in Haywood County approximated \$23,000; that the cost in another county, on an experimental basis, would approximate \$20,000; and that the cost of subsequent work might be expected to average \$18,000 a county.

Viewpoints expressed suggested that the estimated cost was not high in relation to the value of this type of work and that by organizing the work to cover areas larger than a county, the cost per county might be substantially reduced.

Proposed administrative arrangements. At the request of Assistant Secretary Hutchinson, Mr. Gant outlined a suggested arrangement to assure effective cooperation among the agencies and institutions.

Mr. Gant said:

Let us keep in mind a couple of basic premises. One of them is that the Soil Conservation Service has a responsibility which it feels very keenly, and which it feels, and has made clear it feels, it cannot delegate to someone else. That, to me, means it must share in the function of helping to formulate the program which is presented to farmers in a county.

A second fundamental premise, it seems to me, is that the Tennessee Valley region is clearly identified as a special region in its

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administrative arrangements which not only justifies, but, it seems to me, calls for an adaptation of administrative arrangements to meet the particular situation there, and serves to differentiate it from other parts of the country. Now it occurs to me that the first step would be to formulate an understanding that the research which has been applied to Haywood County would be regularized under some kind of understanding between the parties and made available to other areas in the Tennessee Valley as quickly as whatever can be assembled and the budgets of the agencies adjusted to accommodate it. The Tennessee Valley Authority is ready to adjust its budget for that purpose.

Next, it seems to me when the method of procedure has been worked out for a county or a series of counties in an area, whichever the technicians advise is the best way to proceed, that it is necessary and desirable for the Soil Conservation Service people to join with the personnel of the Colleges and with other agencies in carrying out the program in a county. Now because the method of procedure is a guide only, and because many questions of application will arise in connection with carrying it out, it seems to me that it is necessary to have at the state level a method of resolving the problem, a supervision to handle a relationship which will inevitably arise.

It seems to me, then, Dr. Hutchinson, that of several possibilities perhaps the simplest one would be for the Soil Conservation Service to assign personnel to the College with the understanding that they work under a program which the Soil Conservation Service and the Colleges, and all other agencies, have agreed to, so that if there is a question, that can be resolved at the state level.

Now in the third place, it seems to me that there should be an understanding that districts will not be, in the period of this experimental approach, should not be encouraged in other counties in which there are not now districts to serve as an additional method of getting service to the farmers in those areas, but after a year or so of experience, this committee tackle this problem in those areas where there are now Soil Conservation districts. That is the way it shapes up in my mind.

Perhaps I should elaborate on one point: When I speak of assignment of Soil Conservation Service to the Colleges, I realize it can mean several different things. It seems to me they should declare that the Soil Conservation Service, the colleges, and others agree on what the program will be. It is a joint program, and perhaps there should be a representative of the Soil Conservation Service stationed at the college and assigned to the college to supervise the several technicians who work in the county as a sort of liaison on what questions can be resolved; and if they cannot be resolved, then perhaps reference can be made to a regional body or a national agency.

What I am trying to state here is my conception that it would have to be a joint program and not a unilateral program. I emphasize that point because I recognize that there will be many areas, because either Soil Conservation Service personnel or other persons working in the county might not be well adjusted to the county, and administrative

ADMINISTRATIVE ARRANGEMENTS: CORRESPONDENCE

action might have to be taken with one group or the other; there ought to be a smoothly working organization to handle problems of that kind rather than to allow them to fester. It seems to me also it is necessary that when the program gets to the county, it be a unified program.

Now I also recognize that farmer organizations differ from county to county but some of them are ready-made to participate in this expanded program. Others may have to adjust their activities somewhat in order to take on this work. That is a question, it seems to me, also of joint appraisal and administration.

These proposals were discussed at length. At the conclusion of the discussion, Messrs. Dykes and Gant were appointed as a committee to undertake to draw up a mutually acceptable proposal for submission to the Special Advisory Committee.

The subcommittee met at Knoxville on December 14, 1949, and formulated a preliminary statement as a basis for consideration and development of a formal agreement.

Status quo agreement. Assistant Secretary Hutchinson stated that the status quo agreement would be extended to provide an opportunity for the subcommittee to work out and present a proposal to the Special Advisory Committee.

Other Developments

Letter of Knox T. Hutchinson to J. Howard Hornsby. On January 9, 1950, Knox T. Hutchinson, Assistant Secretary of Agriculture, wrote J. Howard Hornsby, Chairman, State Soil Conservation Committee, Peakland, Tennessee, as follows:

Dear Mr. Hornsby:

Mr. J. H. McLeod, a member of your Committee, on January 4 requested that I write the Committee regarding the proposed delay in scheduling of hearings on the three petitions for the creation of soil conservation districts and on the cooperation of this Department with soil conservation districts that may be established within the Tennessee River Valley part of Tennessee.

Since we are interested in all things for the improvement of agriculture, naturally we are interested in the organization and operation of soil conservation districts in localities where they are needed. However, this Department has no responsibility in connection with deciding whether or not a soil conservation district is established. Districts are organized under the soil conservation district laws of the respective states and under these laws the decisions as to establishment rest entirely with the farmers in the localities concerned and the State Soil Conservation Committee--Board or Commission--established by the state legislature as an agency of the state (a) to make findings and decisions as regards

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district organization, and (b) for rendering assistance to the districts that are organized. District organization, therefore, is a matter for local farmers and the executive branch of the state government of which your Committee is a part.

If farmers within the Valley organize soil conservation districts and request it to do so, I am sure this Department will extend assistance to the districts for use in helping farmers plan, apply and maintain conservation on their land. The assistance extended will be of the same type and quantities the Soil Conservation Service is extending to districts in other sections of the country. To do otherwise would be neither carrying out the laws of the Congress nor giving equitable treatment to the farms involved. Of course, in extending such assistance we will do our utmost to work in close harmony with all other agencies.

As you know, the best way of accelerating the conservation program in the Valley has been discussed for some years by representatives of the TVA, the Land Grant Colleges and the Department. The assignment of technicians by the Soil Conservation Service directly to soil conservation districts to assist the district governing bodies in carrying out their locally prepared and adopted soil and water conservation work plans has been questioned by the colleges and the Tennessee Valley Authority. The discussions were recently reopened. After two recent meetings in which I participated, Mr. Gant of TVA and Mr. Dykes of the Soil Conservation Service were designated to cooperate in developing a plan of participation satisfactory to the agencies concerned. I understand that there are still a number of problems to be resolved before they are ready to file a recommended plan.

It is my opinion that in view of the Department's long-time position of advocating and assisting conservation districts as a satisfactory way of the Federal Government and local landowners and operators working together to achieve conservation objectives, that it cannot agree to any plan that will obviate the desirability of districts being organized. The Department can't postpone indefinitely the decision on the method of making Soil Conservation Service assistance available to districts already organized (outside of the State of Tennessee) in the Valley and to any others that may be created there. The choice lies between (1) making the assistance available independently of the colleges and the TVA and (2) making the assistance available in accordance with a jointly developed plan that will provide integrated services from the three agencies. We certainly favor alternative two but unless a mutually satisfactory plan can be developed within the next few weeks, the Department believes it must provide the assistance independently as it has done in the districts now being served in the Valley (Alabama and Kentucky) and in the more than 2,100 being served outside the Valley.

We feel sure that any soil conservation districts that are formed within the Valley area and request assistance of the Department will also need and desire assistance of agencies, other than those within the Department, including the TVA and the Tennessee Agricultural Extension

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Service. This is as it should be. Experience elsewhere indicates the desirability of people having the benefits of several public conservation programs--Federal, state and local. The various types of work and activities supplement and complement each other as has been rather clearly demonstrated, for example, in the Marshall County (a Valley county) Soil Conservation District in Kentucky.

Summarizing, I can offer assurance that the Department will cooperate with soil conservation districts organized in the Valley area if requested by the districts to do so. Changes, if any, in methods used elsewhere for extending such cooperation will be announced soon. And in extending the cooperation under either plan, we will do our utmost to cooperate with all others to help the farmers get the most conservation work done on their lands.

Because we mentioned Messrs. Dykes and Gant above, I am sending each of them a copy of this letter. Also, enclosed are three extra copies which you may desire to send to a district petitioner in the three counties where hearings on district organization have, I understand, been requested.

Sincerely yours,

/s/ K. T. Hutchinson

Assistant Secretary

Letter of George F. Gant to Knox T. Hutchinson. On January 19, 1950, George F. Gant, General Manager, Tennessee Valley Authority, wrote Knox T. Hutchinson, Assistant Secretary of Agriculture, as follows:

Dear Mr. Hutchinson:

I have received a copy of your January 9 letter to Mr. J. Howard Hornsby, Chairman of the Tennessee State Soil Conservation Committee, which you sent me.

Your letter states that if farmers within the Valley organize soil conservation districts and request it to do so, the Department of Agriculture will extend assistance to the districts in helping farmers plan, apply, and maintain conservation on their land. Your letter also states that the Department favors making such assistance available in accordance with a jointly developed plan that will provide integrated services from the Department, the land-grant colleges, and TVA. As your letter recognizes, the Special Advisory Committee, representing these agencies, is developing such a plan and I am hopeful that Mr. Dykes and I, having been designated to prepare recommendations, will be able to propose an acceptable plan to the Committee at an early date.

I understand from our conversation of January 16 that you did not mean to preclude the development of a plan under which the Department, in cooperation with the colleges and TVA, would extend such assistance

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to farmers under the sponsorship of a farmer organization other than a district. I also understand that it is within the discretion of the Department to furnish assistance through channels other than soil conservation districts. This plan would give farmers a choice of whether (1) to form SCS districts or (2) to receive SCS assistance as a part of the cooperative program which has been under way in the Valley for fifteen years--a choice which they are not now aware of.

Of course, TVA has no desire to inhibit the farmers of the Tennessee Valley in obtaining whatever services and benefits the SCS has available for them. One of the problems the Special Advisory Committee is attempting to resolve, however, is whether the Soil Conservation Service is ready to contribute to the development of the Tennessee Valley under arrangements which make use of the efficiency of the organizations through which farmers are now participating in the regional program. For this reason, your assurance that the organization of an additional group, such as soil conservation districts, is not a condition limiting the scope of the Special Advisory Committee's consideration increases the possibility of solving this problem. As soon as you have confirmed my understanding concerning possible alternatives, I can assure you for my part that, depending on Mr. Dykes' schedule, he and I should be able to get together in a few days to draft our report to the Special Advisory Committee.

We can readily understand why there is a desire among some of the farmers to create SCS districts if they believe, as we think they do, that is the only way they can obtain the special services of the SCS. May I suggest, therefore, that you advise Mr. Hornsby of your position on this point and request that he advise the people concerned because the impression is widespread in the Valley that the SCS will cooperate with farmers only on the condition that they organize into SCS districts.

In view of the time elements involved and to be certain that those who are presently considering this problem on behalf of the State are advised of the choices which could be available to them, I am taking the liberty of sending four copies of this letter to Mr. Hornsby and a copy to Mr. Dykes.

Sincerely yours,

George F. Gant
General Manager

Letter of Knox T. Hutchinson to George F. Gant. On February 9, Assistant Secretary Hutchinson replied to Mr. Gant's letter of January 19, as follows:

Dear Mr. Gant:

This is in reply to your letter of January 19 concerning my letter of January 9 to Mr. J. Howard Hornsby, Chairman, Tennessee State Soil Conservation Committee--expressing our attitude toward the proposed

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delay in scheduling hearings on three petitions for the creation of soil conservation districts--and your and my conversation of January 16 at Knoxville, all relating to methods for this Department's rendering assistance to farmer-organized and operated soil conservation districts within the Tennessee Valley Authority.

Workable procedures for public agency cooperation in conservation must be based upon common understanding of principles and a wholehearted desire for complementing and supplementing each other's work and activities toward attainment of conservation objectives. The criteria long considered by this Department to be fundamental as a basis for effective cooperation and teamwork in helping effectuate soil and water conservation work are as follows:

1. Primary responsibility for soil and water conservation rests with landowners and operators. Farm owners and operators will voluntarily accept and discharge this responsibility as they understand its importance to the welfare of themselves and to the nation and public and private agencies working in this field give them guidance and assistance in solving conservation problems.

2. Many soil and water conservation problems can be economically and effectively met only by local owners and operators of land working in unison. Local farmers need to have a well-established way of working together which they can use when they so desire and through which conservation guidance and assistance may be made available.

3. Conservation assistance of public agencies can be most effectively made available, on a wide-scale basis, if farmer groups use a local approach that is somewhat common throughout wide areas of the country for exercising their own initiative and responsibility in soil and water conservation. Sound criteria for such farmer groups indicate that they should be (a) public entities, established by landowners and operators under state law through time-honored process of petition, referendum, and election, (b) managed by a governing body at least the majority of which is democratically elected, (c) concerned primarily with the special purpose of carrying on work necessary to achieving soil and water conservation, and (d) free to request and receive cooperation and assistance from local, state, and federal public agencies and from private sources.

4. These local entities should be the primary instruments for integrating the various local conservation activities.

5. The end result of conservation work is on the land. The conservation objective of public agencies--state, regional, and national--is to help achieve fundamental agricultural betterment on individual farms, in localities, in states, in regions, and throughout the nation. Public activities necessary to accomplishment of the maximum quantity of soil and water conservation work may be generally grouped into three classes--research, education, and technical and other assistance.

For over a decade, when asked for its advice or in answering inquiries as to the methods used in rendering soil and water conservation

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cooperation and assistance, this Department has adhered to the above-mentioned standards. The principles underlying the soil conservation districts correspond more closely to these standards than any organizational plan that has come to our attention. Consistent with these principles, through the Soil Conservation Service, the Department, in addition to about 2100 soil conservation districts, is assisting some 30 local grass conservation and wind erosion districts--that measure up to the above standards and have requested it to do so--in the same manner as it assists soil conservation districts. At the same time, as you know, the Department has recognized--and still does, the soundness of farmer-rancher instrumentalities for meeting other phases of the composite agricultural problem--from cooperative marketing of farm products and purchase of farm supplies, and short and long-term credit, to rural electrification. And, consistent with our interest in all things for the improvement of the Nation's agriculture, if more effective approaches to the problems confronted can be developed, we want to encourage their adoption or use.

Despite the fact that the work of the Soil Conservation Service is more closely related to that of the soil conservation districts than is that of any other federal agency, we have never considered soil conservation districts to be SCS districts. Rather, they are local public entities organized and operated by farmers and ranchers under State law, specifically authorized to request and receive assistance from all public conservation agencies and from private sources for use in helping landowners and operators plan, apply, and maintain conservation on their lands.

For these reasons, this Department intends to cooperate with any soil conservation districts organized within the Valley that request its assistance. We want to make the assistance available to the soil conservation districts in accordance with practical and mutually understood methods that will provide harmonious services from the Department, the Tennessee Valley Authority and other agencies. We certainly will do our utmost to work in close harmony not only with the districts but with all other agencies that have a contribution to make toward attaining conservation objectives. This we continually try to do in the more than 2100 districts being assisted outside the Valley.

We feel that the Department is under obligation to grant the Henderson and Watauga Soil Conservation Districts', North Carolina, requests for assistance. This we intend to do immediately. If we have the assistance to make available, we will also assist any other such districts organized within the Valley that make similar requests. We cannot justify a refusal to cooperate on either legal or policy determinations.

The Department is always interested in ways for simplifying or otherwise improving the methods through which it carries on the work for which it is responsible. Should the report you and Mr. Dykes develop or suggestions from the other sources offer such possibilities, I can assure you they will be given consideration and if found suitable will be adopted. We will keep an open mind towards modifying methods used by the Department. In the meantime, within the Tennessee River Watershed, the Department will follow its nation-wide policy of cooperating with soil conservation districts that request assistance.

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Since you request that I advise Mr. Hornsby of our position, I am sending him a copy of this letter. Because he may find it helpful in advising the people petitioning for the three districts, I am enclosing three additional copies as well. We are also sending a copy to Dean Thomas P. Cooper, Chairman of the Correlating Committee, College of Agriculture, University of Kentucky, Lexington, Kentucky. We, of course, want to cooperate in every practicable manner.

Sincerely,

/s/ K. T. Hutchinson

Assistant Secretary

Letter of George F. Gant to Thomas Cooper. On February 24, George F. Gant, General Manager, Tennessee Valley Authority, wrote Thomas Cooper, Chairman, Tennessee Valley Agricultural Correlating Committee, as follows:

Dear Dean Cooper:

You have received from Assistant Secretary Hutchinson a copy of his letter of February 9, in which he states the criteria considered by the Department to be fundamental as a basis of cooperation, which criteria specifically limit cooperation of SCS to soil conservation districts and exclude the existing farmer groups now participating in the joint cooperative program in the Valley. He also states that the Department will proceed within the Tennessee Valley watershed in accordance with its nationwide policy of cooperating with soil conservation districts that request assistance.

Dr. Hutchinson's letter precludes any hope of progress in the discussions between Mr. Dykes and me as a result of the assignment by the Special Advisory Committee at its meeting on November 29, 1949. There seems to be no point in continuing discussions which would be based upon an abrogation of the Memorandum of Understanding, and unless I receive advice to the contrary, further work on the assignment seems academic. I am so advising Dr. Hutchinson by letter today, copy of which is attached. You may wish to transmit to the members of the Correlating Committee and Special Advisory Committee a copy of this report on the result of the assignment to me at the recent joint meeting.

Very truly yours,

George F. Gant
General Manager

Letter of George F. Gant to Knox T. Hutchinson. On February 24, Mr. Gant replied to Assistant Secretary Hutchinson's letter of January 19, as follows:

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Dear Mr. Hutchinson:

We have received your letter of February 9 in response to my letter of January 19, in which I raised the question whether farmers of the Tennessee Valley would have the choice of receiving SCS assistance without the necessity of forming soil conservation districts. Your letter states the criteria considered by the Department to be fundamental as a basis of cooperation, which criteria specifically limit cooperation of SCS to soil conservation districts when and if they are created and which criteria seem to exclude the farmer groups which are already functioning in every Valley county and through which the Valley farmers participate in the joint cooperative program in the Valley. You also stated that the Department will proceed within the Tennessee Valley watershed in accordance with its nationwide policy of cooperating with soil conservation districts that request assistance.

We had hoped that the Department and TVA, through the good offices of the Correlating Committee and its Special Advisory Committee, could agree upon arrangements whereby the SCS could make its contribution to a unified agricultural development program in the Tennessee Valley. We believed that at the meeting of these committees on November 29, 1949, in which you participated, substantial progress was made in this direction when you authorized Mr. Dykes to work with me in developing a plan for carrying on SCS work in the Valley under procedures not necessarily restricted to the nationwide pattern of providing assistance exclusively through soil conservation districts. In my discussions with Mr. Dykes, I thought we were making progress on this point. Your letter in effect terminates the assignment to Mr. Dykes, and further work along the lines laid out at the meeting of the Correlating Committee and its Special Advisory Committee would be academic. We deeply regret your decision which thus precludes any hope of progress in discussions that seemed promising. In view of this action, I am notifying the Special Advisory Committee that unless I receive contrary advice I see no point in continuing discussions which would be based upon an abrogation of the Memorandum of Understanding.

I am sending a copy of our correspondence to Chairman Cooper as a report on the extent to which I was able to carry out the November 29, 1949, assignment from the Special Advisory Committee.

Sincerely yours,

George F. Gant
General Manager

Letter of J. C. McAmis to Thomas Cooper. On February 24, J. C. McAmis, member of the Tennessee Valley Agricultural Correlating Committee, representing the Tennessee Valley Authority, wrote Thomas Cooper, Chairman, Tennessee Valley Agricultural Correlating Committee, as follows:

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Dear Dean Cooper:

As TVA's representative on the Correlating Committee I have been furnished by Mr. Gant with a copy of his report of February 24 to you, pursuant to the assignment to him and Mr. Dykes at the conclusion of the meeting on November 29, 1949, to develop a proposal whereby the SCS would furnish its assistance as a part of the joint coordinated program in the Tennessee Valley.

You have received a copy of Assistant Secretary Hutchinson's letter of February 9 to Mr. Gant, indicating that the SCS will follow its nationwide policy of cooperating with soil conservation districts when and if they are created within the Tennessee River watershed, without regard to the Memorandum of Understanding. His letter also indicates the intention to grant such requests for assistance immediately, thus ending the agreement to maintain status quo while this subject was under discussion.

I recommend that you report this matter to the members of the Special Advisory Committee and also to the principals to the Memorandum of Understanding because of the changed environment of agency relationships brought about by this action.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. C. McAmis, Member
Tennessee Valley Agricultural
Correlating Committee

Letter from Thomas Cooper to J. C. McAmis. On February 25, Dean Cooper replied to Mr. McAmis' letter of February 24, as follows:

Dear Mr. McAmis:

I received your telegram, informing me that it was necessary to cancel the proposed meeting of the Correlating Committee, which had been set for the 28th. This morning I received your letter and also the letter from Mr. Gant. Ever since we last talked this over, I have been under the impression that something of this kind would develop, although I had hoped that the Secretary's office, as well as the Soil Conservation Service, would consider it desirable to participate with the Tennessee Valley Authority and also the several land-grant colleges and that their participation would be in the nature of cooperation where a reasonable understanding would be in effect. I am taking a little time to think this matter over before attempting to draw up a report to the members of the Special Advisory Committee and others. It is probable that I can do it early next week but I shall first want your advice and that of Mr. Gant and others as to the comment that I may make. Needless to say, I am very much disappointed. I thought Mr. Gant's letter to

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Assistant Secretary Hutchinson a very excellent one and soundly stated. I will write Mr. Gant later but wish you would show him this letter so that he may know that I greatly appreciate the wisdom of the comments which he has made.

Sincerely yours,

/s/ Thomas Cooper

Thomas Cooper
Dean and Director

Letter from Thomas Cooper to H. L. Donovan. On March 20, Thomas Cooper, Chairman of the Correlating Committee, and representative of the land-grant colleges on that committee, wrote President H. L. Donovan, University of Kentucky, as follows:

Dear President Donovan:

I have previously reported to the presidents, various conditions and situations which confronted the land-grant colleges participating in the joint coordinated agricultural development program in the Tennessee Valley in cooperation with the Tennessee Valley Authority and the U. S. Department of Agriculture. At the time the report was submitted, I considered that progress was being made relative to the policy of cooperation with the SCS and its cooperation with the institutions. Among other matters, I called attention to the experiment carried on in North Carolina as a basis of developing cooperation among the three groups. This particular development, in accordance with the reports from North Carolina, seemed to have solved at least partially certain of the questions confronting the institutions with reference to the cooperation of SCS. However, it now appears that the Soil Conservation Service, although participating in this work, does not consider it an adequate basis for projecting its program in the Tennessee Valley area in cooperation with the institutions and the TVA.

At a meeting the latter part of 1949 of the Special Advisory Committee with Assistant Secretary Hutchinson certain further proposals were outlined, particularly by Mr. George F. Gant, General Manager of the Tennessee Valley Authority, and Mr. J. C. Dykes of the Soil Conservation Service, with regard to the relationships and methods of work of the Soil Conservation Service in the cooperative program in the Tennessee Valley. The committee, hoping that a basis for continuing this program could be found, agreed that Mr. Gant and Mr. Dykes would try to reach a compromise which would then be submitted to the Special Advisory Committee and the Correlating Committee for recommendation to the principals to the Memorandum of Understanding. While this assignment was under consideration by Messrs. Gant and Dykes, Mr. Gant received from Secretary Hutchinson the attached letter of February 9 in which the Department states the criteria it considers to be fundamental as a basis for cooperation, which criteria specifically limit cooperation of SCS to soil conservation districts and exclude the existing farmer

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groups now participating in the joint cooperative program in the Valley. He also states that the Department will proceed within the Tennessee Valley watershed in accordance with its nationwide policy of cooperating with soil conservation districts that request assistance.

This statement evidently ends the status quo agreement which was reached following the last meeting of the presidents of the land-grant colleges of the Valley with the Secretary of Agriculture concerning the SCS problem. It probably raises the question of the status of the Memorandum of Understanding which has been in force many years. Under the circumstances, Mr. Gant considers that there is no point in continuing his discussions, unless he receives advice to the contrary. As a matter of information to you, I am attaching copy of the letter of February 24 from Mr. George F. Gant to Assistant Secretary of Agriculture Knox T. Hutchinson.

I regret to send you a report of this nature but it appears that our attempt over the years to bring together a sound arrangement for mutual cooperative action has been of no avail.

Sincerely yours,

Thomas Cooper
Chairman, Tennessee Valley
Agricultural Correlating
Committee

A similar letter was sent to the presidents of the land-grant colleges in the other six Valley States.

Letter from Knox T. Hutchinson to George F. Gant. On April 3, Assistant Secretary Hutchinson wrote to Mr. Gant, as follows:

Dear Mr. Gant:

This is in reply to your letter of February 24, with reference to my letter to you under date of February 9.

In your letter you state, in part, that you see no reason for continuing the assignment of Mr. Dykes and yourself ". . . which would be based upon an abrogation of the memorandum of understanding." We feel sure your reference was to the memorandum of understanding between the United States Department of Agriculture, the Tennessee Valley Authority, and the Land Grant Colleges for the seven States containing area located within the Tennessee River watershed.

Because of the basic content of the memorandum of understanding including the paragraph added in 1942, we see no basis for the formulation of administrative policies and procedures by the Department of Agriculture for its own work being considered an abrogation of that memorandum.

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In my letter of February 9 I outlined certain criteria which the Department has adhered to in carrying out soil and water conservation work. In the same letter I stated that if more effective approaches to the problems confronted can be developed, we want to encourage their adoption or use. At this time I wish to again emphasize, as I did in my letter of February 9, that the Department is always interested in ways for simplifying or otherwise improving the methods through which it carries on the work for which it is responsible. Should the report you and Mr. Dykes develop, or suggestions from other sources, within or without the Correlating Committee and the Special Committee, offer such possibilities, I assure you that they will be given consideration, and if found suitable, will be adopted.

I want to emphasize again that my letter of February 9 does not close the door to TVA or any other agency in the Valley which will cooperate in carrying out our soil and water conservation work. I also want to assure you that we shall do everything possible to give the people of the Valley the benefits of the Soil Conservation Program at the earliest moment.

In the meantime, the Department intends to cooperate with soil conservation districts organized within the Tennessee Valley that request its assistance. I see no valid reason for withholding the Department's service to the farmers of the Tennessee Valley pending our joint attempt to better coordinate the several public agency programs operating there.

I trust that this letter will serve to clear up the misunderstandings of my letter of February 9 which seem apparent in your letter of February 24. I sincerely trust that every effort will be made by yourself and Mr. Dykes and by the members of the joint committees to formulate an arrangement by which we can better coordinate our respective conservation programs.

We are sending a copy of this letter to Dean Thomas P. Cooper, Chairman of the Correlating Committee, and to J. C. Dykes and J. C. McAmis, the other two members of the committee, and to J. Howard Hornsby, Chairman, Tennessee State Soil Conservation Committee.

We assure you of our desire to cooperate in every practicable manner.

Sincerely yours,

/s/ K. T. Hutchinson
Assistant Secretary

Letter from George F. Gant to Knox T. Hutchinson. On April 13, Mr. Gant replied to Assistant Secretary Hutchinson's letter of April 3, as follows:

Dear Dr. Hutchinson:

I am in receipt of your letter of April 3 which again states that "... the Department intends to cooperate with soil conservation

ADMINISTRATIVE ARRANGEMENTS: CORRESPONDENCE

districts organized within the Tennessee Valley that request its assistance," without reference to the Memorandum of Understanding to which the Department is a party. While we may not understand clearly several of your points, we presume the fifth paragraph of your letter is intended to respond to my question on January 19 and February 24, namely, would the Department provide existing farmer organizations in the Valley with Soil Conservation Service assistance without insisting that farmers organize special districts for such purpose. You state that the door is not closed to TVA or any other agency in the Valley which will cooperate. Does this mean the Department would consider extending Soil Conservation Service assistance in the Valley through existing farmer organizations already engaged in soil- and water-conserving farm programs? As I interpreted them your earlier letters ruled this out. For that reason the discussions Mr. Dykes and I had begun, to explore alternatives, seemed superfluous. If this alternative is not considered out of bounds by the Department, then there may be some value in reopening discussions. In any case, the farmers ought to know such an alternative (to SCS districts) exists, if it does. Can you clear up this question for me?

Sincerely yours,

George F. Gant
General Manager

Letter from Knox T. Hutchinson to George F. Gant. Assistant Secretary Hutchinson's reply, dated April 28, to Mr. Gant's letter of April 13, follows:

Dear Mr. Gant:

This is in reply to your letter of April 13.

As we indicated in our letter of February 9, the Department is always interested in ways of simplifying or otherwise improving the methods through which it carries on the work for which it is responsible. This principle, of course, applies to methods for carrying on the Department's work within the Tennessee River Basin.

Your letter seems to indicate that if farmers organize soil conservation districts--under state law, in localities within the Tennessee River Basin, the TVA would not be interested in working with them. I trust this is not the case. We hope that as farmers organize such districts and the districts request assistance from the Department, they will also request and receive cooperation from the Tennessee Valley Authority.

We hope the joint considerations of you and Mr. Dykes will result in recommendations for effective cooperation of the Department and TVA in helping farmers with their soil and water conservation

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problems. Should such recommendations, or suggestions from any other sources, offer possibilities for improving the Department's work, I assure you they will be given consideration and if found suitable will be adopted.

Again, assuring you of our desire to cooperate in every practicable way, I am

Sincerely yours,

/s/ K. T. Hutchinson
Assistant Secretary

On this subject, reference may also be made to the letter of March 9, from Assistant Secretary Hutchinson to Director I. O. Schaub. (See p. 22.)

Letter from George F. Gant to Knox T. Hutchinson. Mr. Gant's reply, dated May 8, to Assistant Secretary Hutchinson's letter of April 28, appears to establish a basis for a continuation of discussions between Mr. Dykes and Mr. Gant, who were appointed as a committee by the Special Advisory Committee, at its meeting on November 29, 1949, to develop and recommend administrative arrangements for Federal-State cooperation on the agricultural program in the Tennessee Valley. Mr. Gant's reply follows:

Dear Dr. Hutchinson:

This acknowledges your letter of April 28. Mr. Dykes has indicated that his schedule is so indefinite that he cannot set a time for our meeting now but that he will get in touch with me later. My April 13 letter did not deal with the question you now raise, that is, TVA's relationship with soil conservation districts. The extent and method of TVA's relationship with such districts were intended to be one of the subjects of discussion with Mr. Dykes and recommendation by the Special Advisory and Correlating Committees, just as were the extent and method of the Department's relationship with existing farmer organizations. In my forthcoming talks with Mr. Dykes I am assuming that both TVA relations with districts and SCS relations with existing farmer organizations are open to negotiation, but if I am wrong please let me know.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

George F. Gant
General Manager

AGRICULTURAL RESEARCH PROGRAM

Classification and Analysis of Farms

A preliminary draft of the report of the study entitled, "Classification and Analysis of Farms, Haywood County, North Carolina: Part I - Narrative," together with Mr. Johnson's letter of transmittal, was mailed to members of the Conference on January 10, 1950.

In the event that the parties cooperating on this study decide to issue a revised report, it is recommended that consideration be given to the following points:

1. Describe fully the basis used for classifying farms.
2. Arrange and present the detailed data for sample farms in the framework of the classification.
3. Evaluate the methods used in the study.

The Correlating Committee is advised that the Committee on Water and Land Use has established the Committee on Method and Procedure for Farm Classification and Analysis in the Tennessee Valley to develop recommendations on this matter. You may receive further information on that when the Committee on Water and Land Use presents its report.

Agricultural Research Program in the Tennessee ValleyReview of Actions Taken

In his letter of March 28, 1946, Secretary Anderson suggested that consideration be given to an expansion of the research work in the Tennessee Valley. At the meeting of the Special Advisory Committee on October 28, 1946, the Tennessee Valley Authority recommended that this suggestion be presented to the Committee on Research. In a letter dated August 18, 1947, the Correlating Committee requested the Committee on Research to submit a report which would include a classified list of the projects in the fields of biological and physical research which are being carried on in connection with the agricultural program in the Tennessee Valley. In response to this request, the Committee on Research submitted a report to the Conference at its meeting on October 1, 1947.

In the discussion of the committee's report, two questions were raised:

1. Should the committee include in its classified list those projects which deal with problems that directly relate to the Valley agricultural program and which are carried on between USDA and one or more Valley agencies or institutions?
2. Should the committee be asked to pursue further the request for the evaluation of current projects and to make suggestions as to new projects and as to new lines of research?

The general question was referred to the Correlating Committee for clarification.

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At the meeting of the Conference on April 7, 1948, the Correlating Committee reported that it had not formulated suggestions on this matter but that a report will be made to the Conference at a later date.

At the meeting of the Conference on April 6, 1949, the Correlating Committee reported further on this matter, as follows:

The committee agreed that effective correlation of the agricultural program in the Valley requires a clear definition of the agricultural objectives under the unified program of watershed protection and agricultural development provided for in the Tennessee Valley Act and a presentation of current research projects and work programs organized in relation to these major objectives. The executive secretary was instructed to work out, in cooperation with selected members of the staffs of the cooperating agencies, a draft of a statement of this type for consideration by the Correlating Committee.

Preliminary Classification of Major Projects and Activities in the Tennessee Valley Region under the TVA Act, 1949

Pursuant to the directive of the committee, a tabulation, dated October 9, 1949, has been prepared, entitled "Preliminary Classification of Major Projects and Activities in the Tennessee Valley Region under the TVA Act, 1949."

Description and use. In this tabulation, an attempt has been made to show graphically the national objectives, program objectives, program methods, and program operations provided for in the TVA Act and to relate the current projects and activities in the Valley to the various program operations and methods which have been developed pursuant to the objectives of the Act.

The primary purpose of the Correlating Committee in developing this classification was to assist the committee in the performance of its functions under the Memorandum of Understanding. The committee anticipates that the tabulation, if kept current, will materially assist the committee in this way, since experience has already shown the usefulness of the classification as a means of orienting the various standing committees in their respective fields of work.

Revision. The committee has submitted the following request to the Tennessee Valley Authority:

In order to assist the executive secretary of the Correlating Committee in revising and maintaining on a current basis the "Preliminary Classification of Major Projects and Activities in the Tennessee Valley Region under the TVA Act, 1949," it is requested that the appropriate officials of the Authority be designated as points of contact for the executive secretary to obtain the information necessary for these purposes.

STANDING COMMITTEES

By memorandum dated February 17, 1950, Mr. J. C. McAmis stated that it is agreeable to the Tennessee Valley Authority for the executive secretary to contact informally and directly designated officials, for the purpose of obtaining the desired information.

Distribution. The present preliminary tabulation was distributed to members of the Conference before it had been reviewed and approved by the committee. Future tabulations will be prepared and distributed for the use of the Correlating Committee and of the standing committees and members of the Conference.

Standing Committees

Subject-Matter Fields

Since the Correlating Committee has the responsibility of referring matters to standing committees, it has been necessary for the committee to set up a general guide for this purpose. In referring proposals or projects to standing committees, the Correlating Committee will be guided by the following general statement of subject-matter fields.

Committee on Plant Facilities and Products. Proposals and projects relating to (1) products research and investigations, including laboratory and pilot-plant studies, tests, and demonstrations of production methods and techniques; (2) operations of TVA plants, with particular reference to the types and relative quantities of the products of such plants; (3) the acquisition of title or rights to raw materials essential to the proper operation of TVA plants.

Committee on Water and Land Use. Proposals and projects involving relationships (1) of the organization and operation of farms to water control and utilization on the land; (2) of types of cover and land use on small watersheds or other appropriate areas to soil and water conservation and utilization; (3) of types and composition of soils and fertilizers to crop and pasture production and to human and animal nutrition; (4) of program objectives and developments to need for relocation and readjustment of rural families.

Committee on Rural Facilities, Services, and Industry. Proposals and projects relating to the unified agricultural program in the Tennessee Valley which involve (1) cooperation with public or private organizations or groups; (2) interrelationships of agriculture, business, and industry; (3) utilization and conservation of land not in farms and of the products of such land (including the use of land and water for recreational purposes); (4) technical and educational services and investigations relating to processing, marketing, and consumption of farm and forest products; (5) development of farm machinery, equipment, structures, and facilities (including rural electrification).

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Committee on Plant Facilities and Products

The Committee on Plant Facilities and Products met at Muscle Shoals, Alabama, on Tuesday, January 17, 1950.

Terms of members. The committee agreed to date the terms of its members from October 5, 1949. Pursuant to the rule adopted by the Conference at its last meeting for the rotation of members of standing committees, Director R. W. Cummings drew the one-year term, Mr. Roland Crumpler drew the three-year term, leaving the two-year term to Director Walter S. Brown, who was not present at the meeting.

Regular meeting. The committee voted to fix the second Monday in November of each year as the date of its regular annual meeting.

Matters referred by Correlating Committee. None.

Recommendations. None.

Subject-matter field. Some question arose in the committee as to whether the operation of TVA nurseries should fall in the field of work of this committee. It was agreed to express as the sense of the committee that the TVA nursery, for the production of tree seedlings, should be included in the subject matter of the committee. The Correlating Committee has made a preliminary allocation of subjects to this committee, as follows:

- Acquisition of phosphate lands and rights
- Phosphate facilities
- Nitrogen facilities
- Small-scale chemical research
- Process development
- Forest nursery operation
- Seed collection
- Power operations
- Multi-purpose reservoir operations
- Chemical operations

Committee on Water and Land Use

The Committee on Water and Land Use met in McCord Hall, University of Tennessee, Knoxville, Tennessee, on Wednesday, December 14, 1949.

Terms of members. The committee agreed to date the terms of its members from October 5, 1949. Pursuant to the rule adopted by the Conference at its last meeting for the rotation of members of standing committees, Mr. T. L. Gaston drew the one-year term, Director Willis M. Baker drew the two-year term, leaving the three-year term to Director P. O. Davis, who was not present at the meeting.

Regular meeting. The committee voted to fix the second Wednesday in December of each year as the date of its regular annual meeting.

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Matters referred by Correlating Committee. As reported to the Conference at its last meeting, the subject of USDA production goals was referred by the Correlating Committee to the Committee on Water and Land Use September 12, 1949. A statement on this subject will be made to the Conference by that committee in its report.

Recommendations. At its meeting on December 14, the Committee on Water and Land Use adopted the following motion made by Director Baker:

I move that this committee recommend the initiation of more watershed studies similar in design and purpose to the sub-project entitled, "Effect of Type of Vegetation and Pasture Management on Water Conservation and Utilization in the Mountain Area of North Carolina," in order to determine the facts of the interrelationships of optimum land and water use under various important conditions of soil and cover.

Dr. Howard T. Rogers explained the project to the committee, as follows:

I have previously stated the background for our interest in pasture management. One of the biggest changes, I think, that has taken place, and is taking place, as a result of our test-demonstration program and increased use of fertilizer, is the improvement of pastures of all kinds. Taking the Valley as a whole, a bigger acreage is affected, I think, by our pasture fertilization program than by any other aspect of our agricultural development work. Certainly pasture improvement is an important practice that we are recommending. Some of that acreage has been idle and a considerable part of it has been in broom sedge and various types of brush cover. We felt it important to find out what effect both type of cover and grazing management--that is, the degree of grazing and the methods of grazing--what effect these practices would have on the utilization of the water that falls on pastureland, i.e., the amount of water that is taken into the soil, the amount that leaves the area through subsurface runoff, the amount that leaves through surface runoff, and the amount that is transpired by the plants. Some water, of course, is lost through evaporation and transpiration. We would like to account for all the rainfall on these areas and to measure the effect of different species of plants on the infiltration properties of the soil and on ultimate distribution of the water.

Small watersheds are now being calibrated in permanent-type pasture covers. Some of these are in bluegrass and white clover. We have one watershed that is in broom sedge, with some briars and brush (a typical unimproved cover). After a calibration period, we will take that area and fertilize it, developing a good white clover-bluegrass pasture to see what the effect will be on subsurface runoff, surface runoff, storage capacity, and infiltration rate of the soil. Then, on some of the areas that have been calibrated in shallow-rooted plants like white clover and bluegrass, we will establish serecia, alfalfa, and other deep-rooted plants.

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There is, also, this question of the effect of degree of grazing on water utilization. One or more of the watersheds will be intensively grazed, but not to the point where we will lose a lot of soil. The interest here, thus far, is primarily in studying the utilization and conservation of water, rather than soil losses. We think it is reasonably well established that under most of the classes of cover we have in these pastures, we can be reasonably sure that we are not going to get severe soil losses. So this is an attempt to get a complete picture of the use of the rainfall on pastureland in that area. We would like to study these factors on at least two major soil types.

If the program expands far enough, we hope to find what the relationship is between runoff from small plots, 1/20 acre, or thereabouts, in size, and the runoff from larger areas, the 5- or 6-acre watersheds. That is, we hope that by having plots in each of the watersheds, and by comparing the surface runoff data from the small-plot areas with the hydrographs from the watershed, it will be possible to get some indication, at least, as to what the relationship is between results from plots and the watershed so far as surface runoff is concerned.

The Correlating Committee endorses the recommendation of the Committee on Water and Land Use and suggests that the committee consider the number and location of sites appropriate for expansion of projects of this type and submit specific recommendations thereon.

Subject-matter field. The Correlating Committee has made a preliminary allocation of subjects to this committee, as follows:

- Flood control studies and investigations
- Farm classification and analysis
- Pilot farm demonstrations and research
- Development and execution of test-demonstration plans
- Maintenance of records of unit and area test demonstrations
- Preparation of reports on unit and area test demonstrations
- Analysis of unit and area test-demonstration results
- Relocation and readjustment of rural families displaced by major construction projects (in these and other areas in which development of processing plants, farmers' cooperatives, or other phases of rural industry and organization is involved in the readjustment, the Committee on Rural Facilities, Services, and Industry will be concerned with those phases of the problem)
- Testing of TVA-produced materials
- Chemical and physical properties of soils
- Fertility requirements of crops and pastures
- Human nutrition studies
- Livestock nutrition studies
- Water and land use studies (including watershed and area studies)
- Agricultural adjustments in problem areas
- Soil survey
- Soil and water management (agricultural engineering)

STANDING COMMITTEES

Committee on Rural Facilities, Services, and Industry

The Committee on Rural Facilities, Services, and Industry met in the Conference Room, New Sprinkle Building, Knoxville, Tennessee, on Wednesday, January 11, 1950.

Term of members. The committee agreed to date the terms of its members from October 5, 1949. Pursuant to the rule adopted by the Conference at its last meeting for the rotation of standing committees, Director E. H. White drew the two-year term, Director H. N. Young drew the three-year term, leaving the one-year term to Dean Frank J. Welch, who was not present at the meeting.

Regular meeting. The committee voted to fix the second Wednesday in January of each year as the date of its regular annual meeting.

Matters referred by Correlating Committee. None

Recommendations. None

Subject-matter field. The Correlating Committee has made a preliminary allocation of subjects to this committee, as follows:

Public recreation facilities
River terminal facilities and operations
Study and development of river transportation
Maintenance of relationships with distributors of TVA fertilizers
Maintenance of records and preparation of reports to service requirements under contracts for distribution of TVA fertilizers
Formulation of educational program relating to objectives of TVA fertilizer program
Education and related activities with respect to agricultural engineering matters
Farm electrification
Farm machinery and equipment
Farm structures
Refrigeration equipment
Food-processing methods
Meat-curing methods
Studies of crop adaptability to commercial processing
Methods for grading food
Changes in food during preparation
Consumers' preference studies
Plant sanitation studies
Forest resource data
Forest industries data
Sawmill studies
Wood preservation
Wood and lumber seasoning
Forest protection
Forest influences
Timber management
Silviculture

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Minor forest products
 Tree distribution
 Technical and educational services (forestry)
 Industrial and institutional demonstrations
 Fire-control demonstration projects
 Technical assistance to State forestry divisions
 Regional fire surveys and analyses
 Sustained yield working-circle demonstrations
 Timber treatment demonstrations
 Grade yield analyses
 Case demonstrations in wood processing and utilization
 Tree farms programs
 Vocational agriculture in-service training schools in woodland management
 Intensive county forestry programs
 Cooperation with Federal Reserve banks in educational work
 Consultative and advisory service to Reservoir Properties Division (TVA)
 Laminated lumber development
 Wood hydrolysis
 Fish investigations
 Game investigations
 Recreation resource development
 Mineral resource development
 Topographic mapping
 Transportation and industrial economic studies
 Advisory assistance to state and local governments

Proposed Regional Film on Land Use

The Correlating Committee reported on the proposal to develop a regional moving picture at the meeting of the Conference on April 6, 1949, and summarized developments on this matter at the last meeting of the Conference, on October 5, 1949.⁵⁷ The committee has no further information on this subject to report. The

57 The composition of the board of directors of the Southern Educational Film Production Service (which is to produce the regional film) was reported to the Conference on April 3, 1946 (Proc. XXV, 58). The present composition of the board of directors is as follows:

*L. A. Olson, Chairman of the Board Contact Officer
 Mississippi Extension Service
 State College, Mississippi

*Felix Grisette, Vice-Chairman
 of Board Executive Director
 Health Publications Institute
 216 North Dawson Street
 Raleigh, North Carolina

*Member of the Executive Committee

-Continued

SUPPLEMENTS TO PROCEEDINGS

topic is mentioned at this point in order to provide an opportunity for a further statement on the subject in the event any member of the Conference may have something to report. (See p. 28.)

Supplements to Proceedings of Valley-States Conference

A statement was made to the Conference at its meeting on October 5, 1949, in regard to a proposed publication of the Correlating Committee, to contain information relating to the work of the committee and of the Valley-States Conference. The eight supplements included in this publication have been issued and distributed to members of the Conference.

Footnote 5 -Continued

*Walter S. Brown, Treasurer of Board	Director Georgia Agricultural Extension Service University of Georgia Athens, Georgia
Harry S. Case	Director of Personnel Tennessee Valley Authority Knoxville, Tennessee
E. C. McReynolds	Associate Director Tennessee Agricultural Extension Service University of Tennessee Knoxville, Tennessee
J. E. Oglesby	State Board of Education Richmond, Virginia
H. B. Newland	Director, Division of Forestry Department of Conservation Frankfort, Kentucky
T. W. Morgan	Agricultural Extension Service Clemson, South Carolina
Lois R. Green	Alabama Public Library Service Department of Archives and History 4 North Union Street Montgomery, Alabama
Henry Becker	Florida State University Tallahassee, Florida
William T. Clifford, Secretary of Board and Director of Production	Director of Production Southern Educational Film Production Service University of Georgia Athens, Georgia

*Member of the Executive Committee

CORRELATING COMMITTEE

Report on Agricultural Development and Watershed Protection in the Tennessee Valley

The Correlating Committee is informed that a report on agricultural development and watershed protection in the Tennessee Valley portion of North Carolina has been submitted to the Tennessee Valley Authority and that in accordance with the request made of TVA by the presidents at the meeting on February 7, 1949, this report will be consolidated with those from the other States into one report covering the entire Valley region.

ADDITIONAL PROPOSALS AND RECOMMENDATIONS

Conference on the Measurement of County Income

The committee wishes to invite the attention of the Conference to a statement entitled, "Plan for a Study of the Amount and Structure of Income in the Southeastern Counties." From this statement, we summarize the following:

The need for further research on the problem of estimating county income has been recognized by many of the research agencies in the Southeast for several years. In June 1949 representatives of many of these agencies met in Lexington, Kentucky, to discuss this problem.

The conferees agreed that the objectives of a research project on this subject should be to:

1. Develop a methodology that will more sharply define the problem and prepare detailed statistical procedures for making estimates.
2. Incorporate the contributions of the researchers in the several States who are familiar with the structure of the local economies and, in doing so, stimulate more intensive research on income in these States.
3. Provide county income estimates for one or two years that will constitute a basis for formulating an annual series of data showing the changes in the level of income over a period of years.
4. Improve present understanding of the economic structure in small geographic areas.

Organizations Sponsoring the Study

The conferees in Lexington then proceeded to form an organization known as the "Conference on the Measurement of County Income."

This conference is comprised of the bureaus of business research of the Universities of Alabama, Georgia, Kentucky, Mississippi, North Carolina,

CONFERENCE ON COUNTY INCOME

Tennessee, and Virginia; and the Tennessee Valley Authority. These research agencies are entering into a contractual agreement to carry on this study jointly.

A steering committee has been established to facilitate transacting the business of the conference in an orderly and democratic manner. Each of the member organizations has one representative on this steering committee and, through this representative, is entitled to one vote. A list of the member organizations, with the representative of each on the Steering Committee, follows:

University of Alabama, H. H. Chapman, Director, Bureau of Business Research
 University of Georgia, Will Hicks, Director, Bureau of Business Research
 University of Kentucky, James W. Martin, Director, Bureau of Business Research
 University of Mississippi, David McKinney, Assistant Director, Bureau of Business Research
 University of North Carolina, Milton Heath, Director, Bureau of Business Research
 University of Tennessee, Charles P. White, Director, Bureau of Business Research
 University of Virginia, Lorin Thompson, Director, Bureau of Population and Economic Research
 Tennessee Valley Authority, W. K. McPherson, Chief, Industrial Economics Branch, Division of Regional Studies

The Steering Committee of the Conference directed its chairman to appoint two committees to assist him in organizing and conducting the study, as follows:

Executive Committee

James W. Martin, Chairman, Director of the Bureau of Business Research, University of Kentucky
 Milton Heath, Professor of Economics, University of North Carolina
 Lorin A. Thompson, Director of the Bureau of Population and Economic Research, University of Virginia
 H. H. Chapman, Director of the Bureau of Business Research, University of Alabama
 W. K. McPherson, Chief of Industrial Economics Branch, Tennessee Valley Authority

Technical Committee

L. C. Copeland, Chairman, Industrial Economics Branch, Tennessee Valley Authority
 Werner Hochwald, Federal Reserve Bank of St. Louis

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John L. Lancaster, Bureau of Population and Economic Research,
University of Virginia

Wendell M. Adamson, Professor of Economics, University of Alabama

The members of the Conference will endeavor to develop a methodology that will consist of a series of procedures for making estimates of the several components of income received by individuals in each county. From these figures the total income received by individuals living in the counties will be estimated. This methodology will allocate the United States Department of Commerce estimates of each component of State income payments to counties. State estimates of agriculture show payments are based on data from the Bureau of Agricultural Economics. As far as possible the allocators used will be based on available measures of income received within each county. This will enable the several States to (a) adopt the procedures that will give the most appropriate estimates of each component of income under different conditions, (b) disclose any discrepancies by using alternative procedures, and (c) identify the additional primary data needed to improve estimates of income in small geographic areas.

The Steering Committee of the Conference, through its committees and chairman will be responsible for coordinating the study and developing procedures that will produce comparable results in all States. To do this, the Conference will employ one administrative assistant and technical staff.

The administrative assistant will be responsible to the chairman of the Conference for carrying out the policy of the Steering Committee for the supervision of the technical staff; for maintaining working relationships among the participants and between the Conference and each agency supplying data; for arranging the necessary conferences between the technical committee and the participants; and for assisting the Steering Committee in identifying problems that must be answered by the Conference.

The technical staff will be responsible for assembling and organizing the results of researches of the participants; for securing federal data to be used by participants; and for consulting with researchers in the several States.

Each state university will be responsible for conducting research on the estimation of county income. To facilitate coordination and to insure the maximum degree of comparability of results, the universities will be provided with an "Outline of Tentative Procedures" that will be revised as necessary. At the outset, this outline of tentative procedures will provide the participants with suggestions and ideas of the technical committee.

With the foregoing information as a background, I wish now to bring to your attention a letter which Chairman James W. Martin, of the "Conference on Measurement of County Income," addressed to the chairman of the Correlating Committee on February 3, 1950.

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Dear Dean Cooper:

After our conference some weeks ago, I discussed with the Tennessee Valley Authority staff members, with whom we are working most closely, the problem of enlisting the cooperation of the Tennessee Valley Agricultural Correlating Committee, of which you are chairman. At the joint suggestion of these gentlemen and of your Secretary, Mr. Clayton, I am now transmitting this letter as our invitation to your group to cooperate in the income study.

The Conference on Measurement of County Income was organized for the purpose of developing techniques and preparing estimates of income in each of the counties in the seven Tennessee Valley states. A copy of our "Plan for a Study of the Amount and Structure of Income in the Southeastern Counties" has previously been submitted to you.

The Conference is endeavoring to secure the best possible advice with respect to estimating each of the components of income. The estimation of agricultural income and farm wage and salary income will be particularly difficult. In order to do the best possible job we should like to have the advice and assistance of the U. S. Department of Agriculture and the land grant colleges of the Valley States. Perhaps this could be done most effectively by (1) establishing relationships between one of the standing committees of the Tennessee Valley Agricultural Correlating Committee and the Technical Committee of our Conference, of which Dr. Lewis Copeland (Tennessee Valley Authority, Knoxville) is chairman; and (2) encouraging each of the member organizations of the Tennessee Valley Agricultural Correlating Committee to work with the members of the Conference on the Measurement of County Income in making out estimates of farm income by counties in their respective states. This cooperation will greatly enhance the value of the study.

Sincerely yours,

/s/ James W. Martin

James W. Martin, Chairman
Conference on Measurement of
County Income

In its efforts to facilitate cooperation on the unified development program in the Tennessee Valley, the Correlating Committee has long recognized the need for a better understanding of the structure of the economy in counties and in small geographic areas, and particularly the need for a better understanding of the relationships between incomes from the nonagricultural and the agricultural segments of the economy. The study which we have previously described to you, entitled, "Plan for a Study of the Amount and Structure of Income in the Southeastern Counties," now being undertaken by the Conference on Measurement of County Income, will contribute materially, the Correlating Committee believes, to the fulfillment of this need.

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The Correlating Committee has asked the Committee on Rural Facilities, Services, and Industry to establish appropriate working relationships with the technical committee of the Conference on Measurement of County Income. The Correlating Committee recommends that the agencies and institutions represented in the Valley-States Conference cooperate closely with the bureaus of business research of the State universities that are participating in the study in developing the best possible estimates of farm income and wages and salaries in agriculture.

Next Meeting of Conference

The Correlating Committee recommends that the next meeting of the Conference be held in Roanoke, Virginia, on Wednesday, October 4, 1950.

REPORT OF COMMITTEE ON PLANT FACILITIES AND PRODUCTS^{6/}
 by
 Charles H. Young, Chairman^{7/}

The Committee on Plant Facilities and Products met at Wilson Dam, Alabama, on January 17, 1950. Actions taken by the committee in regard to terms of its members and date of annual meeting have been reported to the Conference by the Correlating Committee.

As an approach to its work, the committee has tried to obtain a general inventory and description of plant facilities in the Valley with which the committee will be chiefly concerned. This report summarizes the material which the committee has assembled.

TVA FOREST TREE NURSERIES

The TVA Division of Forestry Relations operates three nurseries for the production of planting stock.

The Clinton Nursery

Description

The Clinton Nursery is located on the Clinch River two miles southeast of the town of Clinton, in Anderson County, Tennessee. Approximately 90 acres are suitable for seedling production. The physical plant consists of 12 buildings, including a superintendent's residence and a three-building seed extractory. Plant equipment includes tractors, normal farm equipment, special forest nursery equipment, overhead irrigation system, seed extraction equipment, cold storage plant, and miscellaneous items.

Production

Total to June 30, 1949	95,567,364	seedlings
Estimated for 1950	10,500,000	seedlings
Potential annual maximum	25,000,000	seedlings

6/ See text, p. 33.

7/ In the absence of Chairman Young, the report of the Committee on Plant Facilities and Products was presented by Mr. John H. Walthall.

COMMITTEE ON PLANT FACILITIES AND PRODUCTS

The Muscle Shoals NurseryDescription

The Muscle Shoals Nursery is located in the southeast corner of the Muscle Shoals reservation, Colbert County, Alabama. It has approximately 68 acres suitable for tree production. The physical plant consists of 6 buildings, tractors, normal farm equipment, special forest nursery equipment, overhead irrigation system, cold storage plant, and miscellaneous items.

Production

Total to June 30, 1949	103,429,600	seedlings
Estimated for 1950	13,000,000	seedlings
Potential annual maximum	25,000,000	seedlings

Distribution of Planting Stock

Distribution of forest tree planting stock is handled under contractual project agreements with the state foresters in the Valley portions of Alabama, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. Tree seedlings of the species desired and in the quantities requested by the state foresters are produced in TVA nurseries and distributed through the state agencies to landowners within the watershed. No cash payment for trees is required. The state forester or his field representatives approve all applications; farmer applications are first approved by the extension service. Approval of an application involves all the necessary contacts with the planter--before, during, or after planting--by the appropriate agency to assure that he has the information and assistance he needs to make his plantation successful. His application carries with it his agreement to follow through to this end. The technical assistance of TVA foresters is made available to the state agencies upon request, until these agencies can staff and equip themselves to carry on without this assistance.

TVA also produces a limited amount of planting stock for use by the U. S. Forest Service, Corps of Engineers, and the Soil Conservation Service, outside the Valley. Approximately 4,000,000 seedlings will be produced during 1950 for these agencies.

The Norris Experimental NurseryDescription

The Norris Experimental Nursery is located on the Clinch River three miles northwest of Norris, Tennessee, in Anderson County, Tennessee. Approximately 40 acres are suitable for tree production. The physical plant consists of 6 buildings, tractors, normal farm equipment, special forest

FOREST TREE NURSERIES

nursery equipment, overhead irrigation system, cold storage plant, and miscellaneous items.

Production

Total to June 30, 1949	897,518 seedlings
Estimated for 1950	30,000 seedlings
Potential annual maximum	100,000 seedlings

Distribution of Experimental Planting Stock

The Norris nursery is primarily an experimental nursery for the propagation of special nut tree and forest tree species by budding, grafting, and cuttings. The stock produced is distributed to Valley state experiment stations and to other state and federal cooperating agencies for cooperative forestry experimental projects.

MUSCLE SHOALS PLANT FACILITIES AND PRODUCTS

As an approach to its work, the committee requested a brief description of present plant facilities at Muscle Shoals. The committee also agreed that a statement on research and on products now being produced at the Muscle Shoals plant and their distribution and use should first be prepared and studied before the committee would undertake to go into the question of what products should be produced, etc. A summary of information along these lines follows.

The Present TVA Chemical Plant

Electric-Furnace Units

After obtaining experience in the operation of the two smelting furnaces, a third furnace was added in 1937, a fourth in 1939, a fifth in 1942, and a sixth in 1945-46. Each of these furnaces was of somewhat different design, and the two furnaces originally installed were rebuilt along the lines of those of later development. Recently one of the oldest furnaces was dismantled to make room for a newly developed type of phosphate-smelting furnace with a rotating crucible.

Raw Materials Preparation

This plant includes yard and storage facilities, kilns for the nodulization of phosphate sand, mills for the fine-grinding of rock phosphate, driers, screens, conveyors, elevators, dust-collecting systems, and proportioning equipment.

COMMITTEE ON PLANT FACILITIES AND PRODUCTS

Slag-Handling System

Initially the molten slag from the electric furnaces was tapped into chill cars, cooled, and hauled to a dump. Later, a small plant for crushing and screening the slag was installed and the slag used for road building.

As the production of slag increased with the addition of new electric furnaces, the initial method of handling the material became inadequate. A granulation system was installed and the granulated material is now shipped for agricultural use.

Phosphoric Acid Plants

Several schemes for the manufacture of phosphoric acid from the furnace off-gases have been tried, in pilot plants and in full-scale units. At present each of the electric furnaces is equipped with a system for cleaning the furnace offgases and for condensing the phosphorus. In the acid plants the phosphorus is burned and the P_2O_5 hydrolyzed to form phosphoric acid which is collected and delivered to storage tanks.

Superphosphate Manufacturing Plant

Initially, superphosphate was produced in batch mixers. After long experimentation, a simple, continuous mixer was developed. The freshly made superphosphate is delivered to the storage building. After the superphosphate has cured in storage piles for a few months, it is dug out, disintegrated, screened, and bagged for shipment.

Calcium Metaphosphate Plants

After a long series of small-scale tests and pilot-plant operations, a small production unit for the manufacture of crude calcium metaphosphate was constructed. Phosphorus was burned in a combustion chamber and the hot gases carrying P_2O_5 passed upward through a bed of lump rock phosphate. The phosphate and hot P_2O_5 reacted to form molten calcium metaphosphate, which was tapped from the furnace periodically, cooled, ground, screened, and bagged for fertilizer use.

In recent years a metaphosphate unit that uses phosphate dust instead of lump phosphate has been developed and a plant of this kind is now in operation.

Dicalcium Phosphate Plant

During World War II, when there was a shortage of phosphate for animal feeding, a small plant for the manufacture of dicalcium phosphate was put into operation and has been in production for the past few years.

TVA CHEMICAL PLANT

Calcium Carbide Plant

At the request of the Rubber Reserve Corporation, six carbide furnaces were operated during World War II. Later, during the war, one of the carbide furnaces was removed to make room for a sixth electric phosphate-smelting furnace. Soon after the end of the war, operation of the carbide furnaces was discontinued.

Synthetic Ammonia Plant

A new synthetic ammonia plant having a rated capacity of 160 tons per day was put into operation in 1942.

Nitric Acid Plant

Originally a part of Nitrate Plant No. 2, this unit was rehabilitated during World War II.

Ammonium Nitrate Plant

This plant produces ammonium nitrate solution and grained ammonium nitrate crystal for use as a munition or as a fertilizer. A vacuum-crystallizer plant is now being tested.

Phosphate Washing Plant

The initial beneficiation of the phosphate is carried out in a plant set up near the mining operation northeast of Columbia, Tennessee. An aqueous suspension of the partially washed phosphate is then pumped to a washing plant alongside the railway near Godwin, Tennessee. A part of the washed phosphate sands is used in the production of briquets at Godwin and the remainder is shipped for use in the plant operations at Wilson Dam.

Fused Tricalcium Phosphate Plant

This unit is a part of the Godwin plant. Briquetting equipment presses damp phosphate sand and matrix into briquets which are then fused in shaft-type furnaces, using oil as fuel. The product is granulated by means of water, screened, and bagged for shipment. Fluorine in the furnace offgases is recovered as calcium fluoride in a limestone-packed tower.

COMMITTEE ON PLANT FACILITIES AND PRODUCTS

TVA Production of Phosphate and Nitrogen Products
Fiscal Years 1945-49

	<u>1945</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>
Concentrated Superphosphate	22,358	68,018	128,087	152,540	158,716
Calcium Metaphosphate	4,273	8,104	8,229	6,371	3,509
Fused Tricalcium Phosphate	1,038	15,366	23,144	27,337	15,184
Ammonium Nitrate Fertilizer	111,417	152,967	154,321	154,851	151,239
Dicalcium Phosphate	6,440	24,764	21,731	24,025	36,633
Calcium Silicate Slag	230,789	158,122	218,892	248,038	253,659

TVA Fertilizer Research and Production Activities

Small-Scale Research

Small-scale research consists of (1) exploratory tests of proposed processes and techniques to determine whether the proposals warrant further research; (2) background research consisting of the observation, collection, and organization of facts to provide a foundation for subsequent research and to provide standard reference data; and (3) applied research to devise new or improved products, processes, or techniques.

Phosphate rock may be beneficiated, or the phosphate constituent concentrated to various degrees in ore-dressing processes, depending on the mineralogical constitution of the rock. Small-scale studies of the constitution of the rock, of ore-dressing methods best suited to its beneficiation, and of economical methods for disposal of the wastes is being carried on in conjunction with mining of TVA's phosphate holdings.

A large proportion of the calcium phosphate fertilizer, typified by superphosphate, that is applied to the soil fails to reach the plant because it is fixed or strongly attached to certain soil constituents, or is carried away by erosion and leaching. The mechanisms contributing to leaching and to fixation of phosphate by soil constituents are being investigated in the laboratory. A continuation of such investigations is planned with the objectives of determining the underlying mechanisms and of developing new types of phosphorus-bearing fertilizers that will maintain an adequate level of nutritive phosphate for the plant but will neither leach excessively nor become permanently bonded with constituents of the soil. In these investigations the fixative properties of specific soil minerals will be studied, as will the solubilities, rates of solution, and rates of diffusion of phosphatic materials under conditions simulating those in the soil. These investigations are being complemented by background experimental studies of the fundamental properties of the

TVA FERTILIZER RESEARCH AND PRODUCTION

phosphoric acids, calcium phosphates, and systems involving both calcium and aluminum phosphates.

Encouraging results have been obtained in studies of the preparation and properties of a family of potential fertilizers containing phosphorus and nitrogen in chemical combination, as distinguished from simple mixtures of phosphorus and nitrogen compounds. Solid products containing the equivalent of over 90 percent of P_2O_5 plus nitrogen and yielding good results in plant-growth tests have been prepared, for example, simply by burning phosphorus and treating the combustion products with ammonia. These products appear to have a fundamental structure that facilitates modification of certain of their properties without marked change in their total content of plant food. Extensive laboratory-scale study of the preparation and properties of these compounds is planned, as well as a more exhaustive study of their plant-food characteristics.

Exploratory tests of proposed processes and techniques relating to phosphorus-, nitrogen-, and potassium-bearing materials for use in fertilizers and munitions will be continued to determine whether the proposals warrant further research.

Process Development

This work consists of (1) technical and economic evaluation of research results with the aim of putting them to practical use by development of new or improved fertilizer processes; (2) development of the unit operations necessary to define the process and to obtain data for design of a pilot plant; (3) design, construction, and operation of pilot plants to obtain data for evaluation of the process in terms of engineering and economic factors, and for the design of demonstration- or full-scale fertilizer plants; (4) improvement of design features and operating procedures of demonstration plants; and (5) preparation of engineering and economic studies directed toward practical utilization by TVA or others of the over-all findings.

Emphasis is being placed on the development of a group of related processes for the production of combined phosphate-nitrogen fertilizers from phosphate rock, nitric acid, and ammonia. As compared with present processes for manufacture of phosphate and nitrogen fertilizers, the combined processes offer the following advantages:

1. By utilizing the chemical activity of nitric acid for solubilizing phosphate rock, the expense of sulfuric acid now used for this purpose in most processes is eliminated, and sulfur reserves are conserved.
2. The combination processes would supply a means for effective utilization of the output of fixed nitrogen plants built during the war. Many of these plants do not have satisfactory facilities for conversion to fertilizer.

COMMITTEE ON PLANT FACILITIES AND PRODUCTS

3. By adding potash to the phosphate-nitrogen fertilizer while the latter is in a fluid stage, a complete fertilizer may be produced having superior properties of homogeneity and granulated form, and saving the cost of a separate mixing step. The plant-food concentration of such a product would be approximately double that of the usual mixtures.

One of these processes, by which a phosphate-nitrogen fertilizer is produced from phosphate rock, nitric acid, ammonia, and sulfuric acid, is currently under pilot-plant investigation and development, and products from this experimental operation are being tested agronomically. Another modification of the combination process in which phosphoric acid is used has been developed through the pilot-plant stage and plans are under way for design of a full-scale plant. Two other modifications are in other stages of study. Formulas of some of the products made in these processes are 17-22-0, 12-33-0, and 11-16-0. With the addition of potash, products such as 15-15-1 $\frac{1}{4}$ and 11-11-12 may be made.

A method for making dicalcium phosphate from rock phosphate and phosphoric acid involves subjecting these materials to moderately high temperature and pressure. The advantages of such a procedure are that far less acid, the high-cost element, is required than in the manufacture of concentrated superphosphate. Investigation of the process will be directed toward development of equipment and processing techniques.

Small-scale studies of the wet process for making concentrated superphosphate have indicated opportunities for improvement and resultant economies in fertilizer production. Two possible improvements under study, which should result in lower cost of product, wider use of the process, and conservation of phosphate and sulfur reserves, are: (1) the use of lower grade rock phosphate than is now used in the process and (2) a method for reclaiming sulfuric acid from the by-product calcium sulfate produced in this process. Pilot-plant studies for development of design data, processing techniques, and economic evaluations will be carried out.

Studies will be continued to improve the process for the production of fused tricalcium phosphate fertilizer. Tests in the pilot-plant fusion furnace, which is similar to TVA's experimental full-scale furnaces at Godwin, Tennessee, have indicated that (1) natural gas, the cheapest fuel in many localities, can be used instead of oil, (2) the chemical composition of Tennessee phosphates usually is about optimum, and (3) western and Florida phosphates as mined are not comparable to Tennessee phosphates in furnacing economics but composition of the furnace charge may be adjusted with small amounts of phosphoric acid or other grades of rock phosphate and by addition of a suitable siliceous flux to yield results comparable to those obtained with Tennessee phosphates. The continuing work will center around (1) development of a method for using powdered coal as fuel in the process, since this is the cheapest fuel in some locations, and (2) investigations of suitable refractories for the furnace lining.

Work will be continued on development of methods for decreasing the cost of beneficiating rock phosphate and preparation of furnace-charge materials. Lowering of the cost of beneficiating rock phosphate is of great

DISTRIBUTION OF TVA FERTILIZERS

significance in all phosphate fertilizer production processes, because beneficiation represents an important element of cost in the processes and because of the present increasing problems of conservation and processing economics as the better grades of raw material are depleted.

Work also will be continued on recovery and profitable utilization of process by-products since this is important in the economics of industrial processing. A simple method has been developed for the recovery of fluorine in a commercially usable form from fused tricalcium phosphate furnace gases; a plant for this purpose has been constructed at Godwin, Tennessee. Process development work in the future will be concerned with recovery and utilization of fluorine from calcium metaphosphate and superphosphate operations and profitable utilization of by-product electric phosphorus furnace slag and ferrophosphorus. It is also planned to study methods of preventing atmospheric pollution by dust, fume, and noxious gases to complete the process developments.

Calculations and design work are under way in connection with the use of natural gas in the production of ammonia and with the production of nitric acid and ammonium nitrate fertilizer.

New Chemical Engineering Building

A new building to house chemical research, administrative, and engineering design personnel is nearing completion. When completed, this building will be furnished with the latest laboratory equipment. In addition, the facilities will include an auditorium seating about 300 people.

Distribution of TVA-Produced Fertilizer Materials Fiscal Year 1948-1949

Preliminary Investigations

Problems needing further investigation. Fertilizer investigations, including laboratory, greenhouse, and field tests on sources, rates, and placement of TVA-produced materials, are conducted by the state experiment stations through contractual arrangements with TVA. The Soils and Fertilizer Research Branch, Agricultural Relations Division, has the responsibility for research in this field. Obviously, research in fertilizer technology is geared to research in the use of the products. The following outline shows the types of fertilizers and nature of problems concerning these materials which are being emphasized in our present cooperative fertilizer research activities.

COMMITTEE ON PLANT FACILITIES AND PRODUCTS

I. Dicalcium Nitraphosphate Products

A. Chemical and mechanical analyses

Nominal formula	Particle size (U. S. screens)	P_2O_5 , %		SO_4^2- , %
		Citrate soluble	Water soluble	
17-22-0	-6 \neq 12	23	1	0
17-22-0	-12 \neq 50	23	1	0
12-32-0	-12 \neq 50	32	1 $\frac{1}{4}$	0
1 $\frac{1}{4}$ -1 $\frac{1}{4}$ -1 $\frac{1}{4}$	-12 \neq 50	15	2	0
11-11-11	-12 - 40	11	2	1 $\frac{1}{4}$

B. Information needed

1. Need for water soluble P_2O_5 (17-22-0 vs 12-32-0)
2. Particle size--any advantage or disadvantage to granulation of these materials (-6 \neq 12 mesh vs -12 \neq 50 mesh, or finer material)
3. Sulfur content--should these materials be made to include sulfur, thereby reducing concentration of other nutrients (1 $\frac{1}{4}$ -1 $\frac{1}{4}$ -1 $\frac{1}{4}$ vs 11-11-11)?
4. Effect of placement--broadcast vs banding for row crops or broadcast vs drilling for small grains.
5. Storage properties--do these materials absorb excessive amounts of moisture in handling or cake in storage?

C. General comments

1. These materials should be compared with standard mixed fertilizers of 1:1:1 or 1:2:1 ratio made from ammoniated superphosphate. During the past season these materials were compared with ammonium nitrate plus concentrated super plus muriate of potash as the standard. Probably both standards should be included in future tests with these products. A standard mixed fertilizer containing ammoniated super will be available for field tests in 1950.
2. These materials should be studied on both limed and unlimed soils, as well as on acid and calcareous soils.
3. First year's results suggest some benefit to incorporating muriate in the product while in the slurry form, as contrasted to adding potash as a dry, separate material. Probably some check should be made of any possible benefits from an

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intimate homogeneous mixture of the NPK carriers, such as obtained in these products when the muriate is added in the slurry form. This probably could be accomplished by comparing the $1\frac{1}{4}-1\frac{1}{4}-1\frac{1}{4}$ with a dry mixture of ammonium nitrate, dicalcium phosphate, and muriate of potash.

II. Calcium Metaphosphate

A. Chemical and mechanical analyses

Chemical Analysis

<u>Lab. No.</u>	<u>P₂O₅</u>			
	<u>Total</u>	<u>Citrate soluble</u>	<u>Water soluble</u>	<u>CaO</u>
35803	62.2	61.0	<1.0	24.5

Mechanical Analysis

	<u>Cumulative % through</u>			
	<u>10</u>	<u>20</u>	<u>40</u>	<u>100</u>
A	100	85	50	20
B	100	100	100	40

B. Information needed

1. Availability of the phosphate on limed and calcareous soils (Yield data show this material to be generally satisfactory as a source of phosphate on acid soils.)
2. Effect of particle size--Compare -10 mesh with -40 mesh products (Very limited field tests have been conducted with calcium metaphosphate of different particle sizes.)
3. Effect of placement--Drilled vs broadcast and broadcast on surface vs broadcasting and disking.
4. Factors affecting rate of hydrolysis.
5. Rate of penetration in soil compared with other phosphates.

C. General comments

1. Results from Nelson's field experiments in Iowa and absorption data from tagged metaphosphate appear contradictory so

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far as availability of this phosphate on calcareous soil is concerned. Is this due to difference in particle size?

2. Minnesota work suggested marked advantage to incorporation of metaphosphate in the soil. Is this due to slow rate of hydrolysis when top-dressed and left on the surface?

III. Fused Tricalcium Phosphate

A. Chemical and mechanical analysis

Chemical Analysis

		P ₂ O ₅		CaO	SiO ₂	F
Total	Citric acid soluble	Water soluble				
28.3	24.1	0.0		39.4	22.9	0.25

Mechanical Analysis

Nominal size	Cumulative % through						
	10	12	16	40	80	100	140
-10 mesh	100	97.9	94.9	50.0	9.0	4.9	2.9
-40 mesh	100	99.9	99.8	93.6	40.5	34.4	28.5

B. Information needed

1. Effect of particle size--(-10 mesh vs -40 mesh)
2. Effect of placement--Drilled vs broadcast and broadcast on surface vs broadcasting and disking.
3. Residual effects
4. Effect of boronating on availability of phosphate and boron

C. General comments

1. Since this product is intermediate between superphosphate and rock phosphate in availability, some study should be made of the effects of lime and organic matter content of the soil on availability.
2. The indications are that this material will not be entirely satisfactory the first year on soils extremely low in native

DISTRIBUTION OF TVA FERTILIZERS

phosphorus. For what soil conditions and on what crops can this phosphate be recommended?

3. Three lots of fused tricalcium phosphate containing varying concentrations of boron have been prepared in sufficient quantity for field tests. These materials contain boron ranging from .4% to 1.1% B. Citrate solubility indicates reduced phosphate availability when the boron content is 1.1%.

IV. Miscellaneous Materials

- A. 48% concentrated superphosphate
- B. Rock phosphate (Florida rock, 70% less than 200 mesh)
- C. Diammonium phosphate--analyzing about 23% N and 54% P_2O_5
- D. Potassium metaphosphate--analyzing 35% K_2O and 51% P_2O_5
- E. Electric furnace slag--analyzing about 1% P_2O_5 and neutralizing value of about 80%
- F. Potash-phosphate ash (precipitator dust)--analyzing about 26.2% P_2O_5 and 16.1% K_2O

Concentrated super is used as the standard material in most of our current sources experiments. A number of states also include one or more treatments with rock phosphate to give the entire range in availability. The other miscellaneous materials listed above are available for special tests by the states, but the states are not urged to do extensive work on any of these products.

V. Miscellaneous Questions

- A. What percent of phosphate in commercial mixed fertilizers is in water--soluble form? A composite sample of 4-10-7 sold in Alabama in 1949 showed less than one-third. Jacob of USDA has agreed to make a survey to obtain data on this problem.
- B. How important is sulfur in mixed fertilizers? Thus far, Alabama is the only Valley state which has data to indicate widespread response to sulfur applications. Tennessee and Alabama plan to initiate new work on this problem.

Statistics of distribution. During the fiscal year ended June 30, 1949, materials distributed from the Muscle Shoals plant for preliminary investigations amounted to 405 tons, of which 220 tons (54 percent) were distributed inside the Valley and 185 tons (46 percent) were distributed outside the Valley (tables 1 and 2). Concentrated superphosphate accounted for 129 tons, or 32 percent, of the tonnage of all material distributed for preliminary investigations during the fiscal year. Ammonium nitrate

COMMITTEE ON PLANT FACILITIES AND PRODUCTS

Table 1.- Fertilizer materials: Distribution of output of Muscle Shoals plant fiscal year ended June 30, 1949

Material and area	Prelim- inary investi- gations	Farm test demonstra- tions	Sales ^{1/}	Total
	Tons	Tons	Tons	Tons
Concentrated superphosphate				
Inside Valley	53.00	3,142.30	27,080.70	30,276.00
Outside Valley	75.65	932.15	117,709.15	118,716.95
Total	128.65	4,074.45	144,789.85	148,992.95
Calcium metaphosphate				
Inside Valley	---	352.85	---	352.85
Outside Valley	3.43	4,360.05	---	4,363.48
Total	3.43	4,712.90	---	4,716.33
Fused tricalcium phosphate				
Inside Valley	1.20	16,500.50	---	16,501.70
Outside Valley	41.53	664.35	---	705.88
Total	42.73	17,164.85	---	17,207.58
Ammonium nitrate fertilizer				
Inside Valley	47.35	---	16,600.15	16,647.50
Outside Valley	56.00	---	134,774.30	134,830.30
Total	103.35	---	151,374.45	151,477.80
Anhydrous ammonia				
Inside Valley	---	---	---	---
Outside Valley	5.55	---	---	5.55
Total	5.55	---	---	5.55
Calcium silicate slag				
Inside Valley	65.98	---	24,033.20	24,099.18
Outside Valley	1.00	---	84,024.00	84,025.00
Total	66.98	---	108,057.20	108,124.18
Potash phosphate ash				
Inside Valley	51.50	---	4,181.47	4,232.97
Outside Valley	---	---	125.25	125.25
Total	51.50	---	4,306.72	4,358.22
Dicalcium phosphate				
Inside Valley	---	---	---	---
Outside Valley	.60	---	36,630.55	36,631.15
Total	.60	---	36,630.55	36,631.15

-Continued

DISTRIBUTION OF TVA FERTILIZERS

Table 1.- Fertilizer materials: Distribution of output of Muscle Shoals plant, fiscal year ended June 30, 1949 -Continued

Material and area	Prelim- inary investi- gations	Farm test demonstra- tions	Sales ^{1/}	Total
	Tons	Tons	Tons	Tons
Other materials				
Inside Valley	1.00	----	----	1.00
Outside Valley	1.37	----	----	1.37
Total	2.37	----	----	2.37
All materials				
Inside Valley	220.03	19,995.65	71,895.52	92,111.20
Outside Valley	185.13	5,956.55	373,263.25	379,404.93
Total	405.16	25,952.20	445,158.77	471,516.13

^{1/} Includes 653.00 tons sold for preliminary investigations, 491.70 tons used for "other TVA purposes," and 9,296.00 tons sold for export.

was second in volume, with 103 tons, or 26 percent of the total tonnage of all materials distributed for the purpose during the fiscal year. These two products, concentrated superphosphate and ammonium nitrate, accounted for 58 percent of the total quantity of all materials distributed for preliminary investigations during the fiscal year. Other materials included calcium silicate slag (17 percent), potash phosphate ash (13 percent), fused tricalcium phosphate (11 percent), and anhydrous ammonia (1 percent), with calcium metaphosphate, dicalcium phosphate, and "other" materials each accounting for less than 1 percent of the total (table 2). The total output of the Muscle Shoals plant for the fiscal year was 471,516 tons (table 1). The small quantity (405 tons) distributed for preliminary investigations represented less than 0.1 percent of this total (table 3). These figures are exclusive of 653 tons of TVA products that were sold for preliminary investigations during the fiscal year.

Farm Test Demonstrations

Scope, purpose, and methods of distribution. Test-demonstration activities are carried on through contractual arrangements with the extension services of land-grant colleges. They have two basic functions: (1) to test demonstrate the value, efficiency, economic returns, and best methods of use of new or improved fertilizers, produced by TVA, under practical farm conditions in a program of introduction, education, and experimentation; (2) to demonstrate how improved fertilization can be introduced into, integrated with, and used as a basis for a whole-farm operation so as to promote agricultural development and watershed protection. They are used as a device to acquaint farmers with improved forms of concentrated

COMMITTEE ON PLANT FACILITIES AND PRODUCTS

Table 2.- Fertilizer materials: Percentage distribution of output of Muscle Shoals plant, by type of product, fiscal year ended June 30, 1949

Material and area	Prelim- inary investi- gations	Farm test demonstra- tions	Sales ^{1/}	Combined channels
	Percent	Percent	Percent	Percent
Concentrated superphosphate				
Inside Valley	13.08	12.11	6.08	6.42
Outside Valley	18.67	3.59	26.44	25.18
Total	31.75	15.70	32.52	31.60
Calcium metaphosphate				
Inside Valley	---	1.36	---	.08
Outside Valley	.85	16.80	---	.92
Total	.85	18.16	---	1.00
Fused tricalcium phosphate				
Inside Valley	.30	63.58	---	3.50
Outside Valley	10.25	2.56	---	.15
Total	10.55	66.14	---	3.65
Ammonium nitrate fertilizer				
Inside Valley	11.69	---	3.73	3.53
Outside Valley	13.82	---	30.28	28.59
Total	25.51	---	34.01	32.12
Anhydrous ammonia				
Inside Valley	---	---	---	---
Outside Valley	1.37	---	---	2/
Total	1.37	---	---	2/
Calcium silicate slag				
Inside Valley	16.28	---	5.40	5.11
Outside Valley	.25	---	18.87	17.82
Total	16.53	---	24.27	22.93
Potash phosphate ash				
Inside Valley	12.71	---	.94	.90
Outside Valley	---	---	.03	.03
Total	12.71	---	.97	.93
Dicalcium phosphate				
Inside Valley	---	---	---	---
Outside Valley	.15	---	8.23	7.77
Total	.15	---	8.23	7.77

-Continued

DISTRIBUTION OF TVA FERTILIZERS

Table 2.- Fertilizer materials: Percentage distribution of output of Muscle Shoals plant, by type of product, fiscal year ended June 30, 1949 -Continued

Material and area	Prelim- inary investi- gations	Farm test demonstra- tions	Sales ^{1/}	Combined channels
	Percent	Percent	Percent	Percent
Other materials				
Inside Valley	.25	---	---	2/
Outside Valley	.33	---	---	2/
Total	.58	---	---	2/
All materials				
Inside Valley	54.31	77.05	16.15	19.54
Outside Valley	45.69	22.95	83.85	80.46
Total	100.00	100.00	100.00	100.00

1/ See footnote 1, table 1.

2/ Less than .01 percent.

phosphate fertilizers, show them how to use these fertilizers in a soil-building rather than an exploitative system of agriculture and demonstrate its economic feasibility. These farms have served to bridge the gap between state experiment stations and practical farms. They have supplemented laboratory, greenhouse, and field plot investigations, all of which are necessary but are not complete in themselves.

Test demonstrations are being conducted in 26 states at the present time. As of July 1, 1949, there were 9,000 farms cooperating. Congress appropriates funds each year to pay part of the cost of furnishing fertilizers to these cooperating farmers. The farmers themselves pay a portion of the cost. Fertilizer is furnished to unit test-demonstration farmers at freight and handling cost during the first three years they are test demonstrators. After participating three years, they pay 50 percent of the f.o.b. plant price plus freight and handling charges. Area test demonstrators pay 50 percent of the f.o.b. plant price plus freight and handling charges during the entire time that they are participating.

Test-demonstration fertilizer materials are distributed to cooperating farmers through contractual arrangements with regional cooperatives, state cooperatives, county cooperatives, and test-demonstration associations and by direct shipments to groups of cooperating farmers with payments in advance or shipments made sight draft. In other words, TVA distributes through the appropriate farm organization serving a particular area.

TVA contracts with Tennessee Farmers Cooperative in Tennessee for the distribution of test-demonstration materials in this state with the exception of two counties (Campbell and Anderson). In these two counties TVA contracts

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Table 3.- Fertilizer materials: Percentage distribution of output of Muscle Shoals plant, by type of disposal, fiscal year ended June 30, 1949

Material and area	Prelim- inary investi- gations	Farm test demonstra- tions	Sales ^{1/}	Total
	Percent	Percent	Percent	Percent
Concentrated superphosphate				
Inside Valley	.18	10.38	89.44	100.00
Outside Valley	.06	.79	99.15	100.00
Combined areas	.09	2.73	97.18	100.00
Calcium metaphosphate				
Inside Valley	---	100.00	---	100.00
Outside Valley	.08	99.92	---	100.00
Combined areas	.07	99.93	---	100.00
Fused tricalcium phosphate				
Inside Valley	.01	99.99	---	100.00
Outside Valley	5.88	94.12	---	100.00
Combined areas	.25	99.75	---	100.00
Ammonium nitrate fertilizer				
Inside Valley	.28	---	99.72	100.00
Outside Valley	.04	---	99.96	100.00
Combined areas	.07	---	99.93	100.00
Anhydrous ammonia				
Inside Valley	---	---	---	---
Outside Valley	100.00	---	---	100.00
Combined areas	100.00	---	---	100.00
Calcium silicate slag				
Inside Valley	.27	---	99.73	100.00
Outside Valley	^{2/}	---	100.00	100.00
Combined areas	.06	---	99.94	100.00
Potash phosphate ash				
Inside Valley	1.22	---	98.78	100.00
Outside Valley	---	---	100.00	100.00
Combined areas	1.18	---	98.82	100.00
Dicalcium phosphate				
Inside Valley	---	---	---	---
Outside Valley	^{2/}	---	100.00	100.00
Combined areas	^{2/}	---	100.00	100.00

-Continued

DISTRIBUTION OF TVA FERTILIZERS

Table 3.- Fertilizer materials: Percentage distribution of output of Muscle Shoals plant, by type of disposal, fiscal year ended June 30, 1949 -Continued

Material and area	Prelim- inary investi- gations	Farm test demonstra- tions	Sales ^{1/}	Total
	Percent	Percent	Percent	Percent
Other materials				
Inside Valley	100.00	---	---	100.00
Outside Valley	100.00	---	---	100.00
Combined areas	100.00	---	---	100.00
All materials				
Inside Valley	.24	21.71	78.05	100.00
Outside Valley	.05	1.57	98.38	100.00
Combined areas	.09	5.50	94.41	100.00

^{1/} See footnote 1, table 1.

^{2/} Less than .01 percent.

directly with the county cooperatives, TFC in turn contracts with member county cooperatives, and they in turn have agreements or memorandums of agreement with the local test-demonstration association for handling test-demonstration materials. No test-demonstration material is moved into the out-of-Valley counties in Tennessee.

In the Valley area of each of the four states, Kentucky, Virginia, Georgia, and North Carolina, TVA contracts with a federation of local cooperatives (the local cooperatives being co-signers of the contract) for the distribution of test-demonstration materials in the Valley counties. In out-of-Valley counties in Georgia, TVA contracts directly with two counties and ships material on the transmittal contract (payment in advance) in the others. In the out-of-Valley counties in Kentucky, materials are distributed by direct contract with one county, and in another through the federated cooperative; Valley Counties of Kentucky Cooperative, Incorporated, by a letter of agreement between Valley Counties of Kentucky Cooperatives and the county farm demonstration association. Other out-of-Valley counties in Kentucky use the transmittal contract with payment made in advance. In the Valley counties in Alabama, TVA contracts with Associated Cooperatives, Inc., and Associated Cooperatives contract with Tennessee Valley Cooperatives, Incorporated. The local or county cooperatives are parties to the contract between Associated and Tennessee Valley Cooperatives, Inc. The county cooperatives in turn have memorandums of agreement with test-demonstration associations. In the out-of-Valley counties in Alabama, TVA ships direct to test-demonstration associations, using the agreement on the reverse side of the transmittal sheet as a contract and requiring payment in advance for materials. In Mississippi, TVA contracts directly with the county cooperatives in the Valley counties and with county cooperatives and test-demonstration associations in the out-of-Valley

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ccounties. In the out-of-Valley counties in North Carolina, the transmittal contract is used with payments in advance.

With the exception of Indiana, test-demonstration materials are distributed under the transmittal contract in all the counties in non-Valley states. In Indiana, TVA has direct contracts with county cooperatives.

TVA allows a maximum margin of \$4.00 per ton for handling test-demonstration materials. In practice, this handling charge varies from zero to the maximum. Where two or more cooperatives or farmer associations are parties to contractual arrangements, this margin is often divided among the parties. In Alabama, Tennessee Valley Cooperatives gets \$1.00, test-demonstration associations \$1.00, and county cooperatives \$2.00 per ton of test-demonstrational material. In Tennessee, Tennessee Farmers Cooperative make no charge and county cooperatives and test-demonstration associations often split the margin, varying from one-third to two-thirds each way. This money is used to promote the agricultural program of the organization.

Test-demonstration materials are used on practical farms and distributed so as to insure their use in a soil-improving type of agriculture and on a basis permitting as many farmers as possible to view the results. The agricultural extension services assume the responsibility of guiding the development of procedures at state and county levels. County and assistant county agents assist test demonstrators in making their whole farm plans. Research information is supplied by the agricultural experiment stations to be used as a guide for developing improved farming systems, including proper land use, recommended cropping systems, varieties, fertilizer and lime use, date and rate of seeding, and crop and livestock management. Test-demonstration fertilizers are used only on crops which are not intertilled, such as pastures, meadows, and small grains or in soil-building crop rotations. Rates per acre and length of time covered by application varies by states, but in all states experiment station recommendations are followed. In some of the out-of-Valley states, soil tests are made and rates of application recommended according to the soil tests for the specific crop to be grown. Each state makes an annual plan of work which is approved by TVA and in which eligible crops and rates of application are given. This is used by TVA in approving requisitions for individual farms and fields.

In making state allocations consideration is given to program needs, historical use of materials and equitable distribution by counties. The test-demonstration activities by nature require relatively long periods of time for proper development. Sudden and abrupt changes in amounts of material would upset the entire educational program in a state and react unfavorably upon those responsible for the program. This means that changes either increasing or decreasing the amounts of demonstration materials are made as gradually as possible within budgetary limitations.

Statistics of distribution. During the fiscal year ended June 30, 1949, materials distributed from the Muscle Shoals plant for practical farm test demonstrations amounted to 25,952 tons, of which 19,996 tons (77 percent) were distributed inside the Valley and 5,956 tons (23 percent) were distributed outside the Valley (tables 1 and 2). Fused tricalcium phosphate accounted for 17,165 tons, or 66 percent of all material

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distributed for farm test demonstrations during the fiscal year. Calcium metaphosphate, 4,713 tons, or 18 percent of the total tonnage of all materials distributed for this purpose, and concentrated superphosphate, 4,074 tons, or 16 percent, were the only other products distributed for test demonstrations during the fiscal year. The total tonnage distributed for farm test demonstrations represented less than 6 percent of the total production of the Muscle Shoals plant during the fiscal year (table 3). Of the total tonnage distributed inside the Valley, however, 22 percent went for test-demonstration purposes.

Sales

Method of distribution. TVA fertilizer materials are distributed to farmers through their own organizations with which TVA has contracts defining the conditions under which the materials are to be sold. Outside the Tennessee Valley, there are contracts with three large regional cooperatives whose service areas cover the greater part of the country. Inside the Tennessee Valley there are direct contracts with five federated cooperatives and with a few Valley counties. All of these contracts have been as uniform as varying circumstances would permit. In the great majority of cases the local cooperatives also handle test-demonstration materials.

The 1949 contracts contained restrictions on the use of the sales fertilizer materials. Phosphate fertilizers were to be offered for sale in unmixed form and were not to be used in commercial mixed fertilizers which contained nitrogen. Phosphates were to be sold only to individuals who agreed to use the materials on crops which were not intertilled, such as meadows, pastures, and small grains, or in soil-building crop rotations. Cooperatives gave preference in sales to those known to be following farming practices which were consistent with test-demonstration objectives. During 1949 phosphates were sold only in states which had test-demonstration activities.

Nitrogen fertilizers were sold only to those persons who agreed to undertake to use them in a manner consistent with the best methods of fertilization and in the interest of soil and water conservation. Preference was given to those farmers who would apply the fertilizer in unmixed form. Near the end of fiscal 1949, it was found possible to allocate a substantial tonnage of ammonium nitrate for specific use in the southeastern states on winter cover crops for winter and spring grazing.

The contracts with cooperatives for fiscal 1950 reflected a step forward, in that the approach was positive instead of negative. Cooperatives themselves submitted suggested contracts, which, with necessary negotiated adjustments, were signed. These contracts obligated the cooperatives, with the aid and assistance of their respective state extension services and experiment stations, to work out and initiate educational programs for the use of both phosphate and nitrate fertilizers, to submit these educational programs to TVA, and also at a later date to submit analyses of the results obtained by the use of the materials in accordance with their educational programs.

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Basis of determining quantities for states or areas. The basis for determining the amount of the various fertilizer materials which are to be shipped into the various states is a rather complex matter. It consists of considering all the various factors which affect the need for and use of fertilizers in a particular state or area against the situations in other states or areas. In the past, this has been greatly complicated by fertilizer shortages which often necessitated reallocations. Among the most important factors considered were the ability to effectively use the materials in the light of the test-demonstration experience, the historical pattern of distribution modified by rapidly changing conditions in various areas, and the need for fertilizer materials for the production of food and fiber crops. Under present contracts and conditions, it will be possible to give considerably more weight in the making of allocations to the effectiveness of the educational programs of the various cooperatives developed in cooperation with the land-grant colleges.

Outlets for dicalcium phosphate and calcium silicate slag. Calcium silicate slag, a by-product, has been sold as a liming material in the area of feasible distribution to anyone wishing to buy a car of the material. It is sold without contract.

Dicalcium phosphate is being produced as an emergency measure to aid in relieving the shortage of animal feed supplements. It is expected production of this product will be discontinued at the end of the present fiscal year. This product has been sold in areas of greatest shortage to cooperatives or to private feed manufacturers, dealers, etc., under no contract.

Basis for selection of cooperatives as channels of distribution. Cooperatives were selected as channels for distribution for several reasons. The Act specified that TVA shall arrange with farmers and farm organizations for the large-scale use of its fertilizer materials. Farmers and their organizations work closely with the extension service with which TVA is also authorized to cooperate. TVA has not been able to devise or discover any other effective channel of distribution whereby its experimental fertilizers can reach farmers as cheaply or as effectively for use in accordance with the specific agricultural objectives and obligations TVA is directed to accomplish under the Act.

Statistics of distribution. During the fiscal year ended June 30, 1949, materials distributed from the Muscle Shoals plan through sales amounted to 445,159 tons, of which 71,896 tons (16 percent) were distributed inside the Valley and 373,263 tons (84 percent) were distributed outside the Valley (tables 1 and 2). (Included in the total tonnage distributed through sales are 653 tons sold for preliminary investigations, 492 tons sold for "other" TVA purposes, and 9,296 tons sold for export.)

Ammonium nitrate fertilizer accounted for 151,374 tons, or 34 percent of the tonnage of all materials distributed through sales during the fiscal year. Concentrated superphosphate was second in volume, with 144,790 tons, or 33 percent, and calcium silicate slag was third, with 108,057 tons, or 24 percent of the total tonnage of all materials distributed through sales. These three products accounted for 91 percent of the total tonnage of all

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materials distributed through sales during the fiscal year. Other products handled in this way included dicalcium phosphate (36,631 tons), and potash phosphate ash (4,307 tons).

The total tonnage distributed through sales represented 94 percent of the total production of the Muscle Shoals plant during the fiscal year (table 3). Of the tonnage distributed inside the Valley, sales accounted for 78 percent; and of the tonnage distributed outside the Valley, sales accounted for 98 percent.

REPORT OF COMMITTEE ON WATER AND LAND USE^{8/}
by
Frank S. Chance, Chairman

The Committee on Water and Land Use met in Knoxville, Tennessee, on December 14, 1949. Actions taken by the committee in regard to terms of its members and date of annual meeting have been reported to the Conference by the Correlating Committee.

WATERSHED AND AREA STUDIES

In view of the increased attention that is being given to watershed and area studies in the Valley, the committee discussed this subject in a preliminary way. Director Willis M. Baker, who is a member of the committee, is also in general charge of the watershed development projects of the Tennessee Valley Authority. Director Baker made a brief statement to the committee in regard to projects of this type. Director Baker said, in part:

Over the years, the various divisions and units of TVA have cooperated very closely with a large number of agencies of all kinds working in the Valley, including the land-grant colleges. In many instances, the varied scope of the projects undertaken has covered such a wide area of interests that I think it may have been difficult at times for some of us to keep our attention focused on what are actually the primary objectives and purposes and responsibilities of TVA under its Act of Congress, namely, the unified development of the Tennessee River system integrated with regional development of resources. I think this means, among other things, watershed management which solves problems and develops opportunities involved in the balanced use of land and water. Obviously the Tennessee Valley program, to be most effective, must be geared to the primary objectives and responsibilities authorized by the Act of Congress which created the opportunity for this program. It appears that the interests of this Committee on Water and Land Use coincide very closely with the basic elements of the Tennessee Valley program. It occurs to me, therefore, that this committee can perform an invaluable service in helping to keep the attention of all of the participants in the Tennessee Valley program focused on the primary objectives of that program.

8/ See text, p. 38.

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You may be interested in a measure which the TVA now has under consideration for achieving more concentration of effort and better integration in some of this work. Thinking along the lines I have indicated, our Board of Directors has recently authorized what is known as the small watershed approach, which, primarily, is to explore and test the most effective ways and means of getting things done in the interest of regional development within small, strategic watersheds where important problems and important opportunities exist. This approach will be followed in watersheds where we have reason to believe that the people concerned, and the cooperating agencies concerned, are ready to undertake the work that needs to be done to solve the problems, develop the opportunities, and to measure the results. Essentially, this approach is no different from what has been done, with this one exception: more emphasis will be placed on getting real integration of efforts on all related problems that are pertinent and important in bringing about the development we are all trying to achieve.

You are familiar with the Chestee project which was undertaken several years ago and in which considerable progress has been made--a 85,000-acre watershed located in East Tennessee between Athens and Etowah--and where the engineers under Mr. Fry have established a number of installations and studies--installations for stream gaging and measuring rainfall, and various other devices to get knowledge of what is happening there in the way of precipitation, flooding, and so on. The agricultural agencies have set up several area demonstrations within that area. A little progress has been made in establishing forest fire control (now authorized in Polk County), and there are some prospects now of its expanding to other sections of the watershed. Also, an effort was made last year to stimulate tree planting where that was desirable. The project was not thoroughly organized and has proceeded rather less rapidly than we had all hoped for. The TVA is now attempting to help organize such projects more effectively under this small watershed approach, and the Chestee project is the first one under consideration. We are now preparing authorization for approval.

FLOOD CONTROL STUDIES AND INVESTIGATIONS

Closely related to the topic discussed by Director Baker is the subject of flood control studies and investigations. A. S. Fry, Chief, Hydraulic Data Branch, Tennessee Valley Authority, discussed this work with the committee. Mr. Fry said, in part:

We are concerned, of course, with respect to our reservoirs and streams and erosion problems. We have made enough studies of the silt carried by streams throughout the Tennessee Valley and the sedimentation in our reservoirs so that we are satisfied that we do not have any very acute problems there. Our reservoirs, on the whole, will have useful lives at several thousand years, but obviously the more erosion we can eliminate, the longer the lives of those reservoirs will be. Some of our main-river projects will have the shorter lives even in those long-lived projects, so that it is important that areas like Elk River, for instance, be treated as well as possible from the standpoint of vegetal cover, so that erosion is minimized to the maximum degree. We are also interested in the

FLOOD CONTROL STUDIES AND INVESTIGATIONS

effect of cover on runoff, particularly as it may influence the seasonal distribution of runoff. That is a question on which we will not find unanimity of opinion, either in TVA or outside. We certainly need to carry out experiments to really find out whether, by changing cover, it will be possible to change the runoff characteristics sufficient to affect the water in the stream and the quantity of water that is available at different seasons of the year that might be useful when it reaches our power production plants. It has been proposed to change the cover so that there will be more groundwater available at the end of the summer for fall runoff at the time water is usually needed for power. Whether such changes are possible is something to which we do not know the answers, but we certainly need to know the answer in water and land-use problems.

In the Tennessee Valley, we have something over 200 stream gages that I thought perhaps the committee might be interested in. These gages are located, particularly, where they will provide information on runoff from the areas that are of significant importance in the control of the Tennessee River system, or for some other purpose that may not be particularly related to TVA, because there are a number of state streamflow locations where TVA might not be interested. The runoff characteristics in general are reasonably well defined for relatively small watersheds scattered throughout the entire Tennessee Valley. Those watersheds probably would be considered in studies that develop under the small watershed development program. The information from those stations will undoubtedly be of value in that study.

One of the uses that we make of certain streamflow stations each month is to evaluate the amount of water that is stored underground above our principal projects, such as Norris Dam, for instance, in connection with the scheduling of the use of power over a period of two or three months ahead. It is of significant value to know how much water is not only, for instance, in Norris Reservoir, but how much is underground in the watershed above that reservoir. That sounds, at first, like a very difficult problem. It is not easy, but by certain engineering techniques, we are able to analyze the hydrographs of the stations which contribute to Norris Reservoir so that we are able to tell how much water we have in storage at the beginning of each month. We know, too, how much of that water will run off in the next thirty, sixty, or ninety days. We find, for instance, at Norris Reservoir, at the beginning of November, we had an inch of water stored underground in addition to that which was in the reservoir itself. At Fontana, which is a different character of watershed, we have five and one-half inches stored underground above the reservoir. That is like money in the bank, because we know it will come out, and we can count on that. In contrast to the five and one-half inches that we had on the first of November this year at Fontana, we had in 1939, for instance, only eight-tenths of an inch. We might have had the same volume in the reservoir on that date that we did this year, but the difference in the amount of water that is available for use there is very considerable. This shows that that evaluation of underground water is very important.

Cover ties into the matter of underground water because of the possibilities that good cover can put more water underground and make it available

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for sustaining stream flow during times when it can be of most use to the river system. There is a definite tie from that point of view. The problems of small watersheds, which Mr. Baker told us about, are getting more and more acute throughout this area. I attended a hearing yesterday at Greeneville, Tennessee, which was conducted by the Army Engineers in connection with a proposal there by the people in the Lick Creek Valley, near Greeneville, for the Government to study that and make a plan for flood control for Lick Creek Valley. That is one of a number that have come up recently. There were two others last week down in Alabama on the Paint Rock and Flint Rivers, and there is one coming up down in Alabama on Mud Creek, a couple in Tennessee on Soddy Creek, and one near Dunlap in the Sequatchie Valley. Those are small valleys where the flood problems have caused the farmers to want to see if there wasn't something that can be done about the situation.

Unfortunately, the probabilities are that in most cases, it is not going to be economically feasible to do anything by engineering methods, that is, by constructing channels and building levees, dams, and things of that kind. The cost in most cases would be so great that it wouldn't be economically feasible to do the work. That gets close to the work of this committee, which is work on the watershed which will alleviate and mitigate the flood problems which those watersheds are now faced with. Take Lick Creek, for instance; the Valley up there varies from one-half to three-quarters of a mile, with some 8000 acres in a distance of about 50 miles. If you build a channel that would be big enough to take care of the water that comes down there, it would take a large part of the Valley. Water runs in from the sides of the watershed, and that water has to be taken care of. It becomes a very expensive proposition. If you can do something on the watershed itself that will help the situation, then that certainly is a fine thing to have done. In most of these watersheds, the problems are going to resolve themselves down to that kind of a solution.

The Chestee watershed, that Mr. Baker mentioned, arose from that very sort of situation. The creek overflowed the lands in McMinn and Polk Counties to such an extent that the farmers there got busy through the county courts and asked TVA to look into the matter and see if they could find any solution to their problem. TVA did that, but they found that there was no feasible engineering way of doing it. But it did seem desirable then to look into other methods that might be carried out that would give the desired relief. Those methods would have to be a combination of work on the watershed itself, plus cleaning out the channel to something like its former size. In that case, the soil from the uplands had washed down and filled in the channels so that these are no longer nearly as large as originally. The result has been that any small rise that comes now overflows the channel, and the bottomlands in the valleys, which should be used for row crops, are overflowed so frequently that this is generally too hazardous to be feasible. That forced the row crops up on the hills where they don't belong. This just reversed the type of farming from that which is considered most desirable.

We know more about the Chestee than any other small watershed in the area, since we have studied it over a period of something like 5 years. We have gaging stations where we measure the stream flow, and we have a

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large number of rainfall stations, so that we know accurately what the rainfall is. We are experimenting now with three installations of soil-moisture meters to a depth up to 20 feet by which we are studying the movement of water through the soil and the amount of water that gets into the soil at the various installations. We find considerable differences in soil must be considered in determining how much water goes in and how much runs off. As a result of our measurements at Chestuee, we itemize monthly and annually the rainfall in various components. One component embraces consumptive use, replenishment of soil moisture deficiency, plus evaporation and other losses. Other components are surface runoff, recharge to the groundwater table, the water that is drawn from the underground reservoir or groundwater, and the water that is retained. For instance, in the year 1948, in that watershed, we had a total rainfall of 57.9 inches. Of that, the consumptive use and other losses were 32.4; surface runoff, 10.3; 15.3 inches went into the groundwater table. During that year, 12.9 inches came out of groundwater so that we had a total annual runoff of 23.2 inches. We had left in the ground, at the end of the year, two and one-half inches of water to carry over into the year of 1949.

We are carrying on a number of other watershed experiments, three of them cooperatively with the Division of Forestry Relations and one with the Division of Agricultural Relations and North Carolina State College. One of those with the Forestry Relations is in Henderson County, Tennessee. That is a small watershed which was very badly gullied. The Forestry Relations Division treated the watershed with plantations, check dams in gullies, and have protected the watershed so that there has been a very definite reduction in peak flows during all seasons of the year. The characteristics for runoff are now quite different from what they were in the beginning. Another area is in the watershed of Norris Dam, an area which is owned by TVA, an 1800-acre watershed known as White Creek. That area has largely been left to grow up in the last 10 years. The result of that has been that the high peaks which came from the rainfall in the early days have been very noticeably reduced as a result of the increased growth and cover on that watershed.

Over in the Copper Basin, we are carrying on another study that has been quite interesting. There are two small areas, about 6 acres each. One of them has been left in a denuded condition, and the other has been covered with weeping love grass and the gullies were treated with dams. The results in stopping the erosion there have been very striking. The runoff figures have been in the order of one-half from that which has been treated with love grass, as compared with that which is denuded. Another study which has been started within the last year is one in co-operation with the North Carolina State College at the Mountain Experimental Farm near Waynesville, North Carolina. This includes five small watersheds, two pairs of two each and one isolated watershed, where a long-time study has been initiated to determine the effect of the various types of pasture cover on runoff, infiltration and other factors on one type of soil.

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SOIL AND WATER MANAGEMENT

I reported to the committee some of the results of our experiments in soil management for water control at the Knoxville, Greeneville, and Springfield stations.

Cropping systems or soil management is just one of the methods of holding water where it falls, according to definite observations and data that we have. More than 10 years ago, in cooperation with TVA, we put in some runoff studies in the station at Greeneville and also here on the station at Knoxville. On one at Knoxville, we were studying vegetable crops and using strip cropping for studying water and soil losses. It was, at that time, called Cumberland soil, and a lot of it was going down the river.

At Greeneville, the cropping systems were different in that field crops were used there. The whole setup was a little different. That was on 10 percent slope, with a fall just about the length ordinarily considered between contours. There, at Greeneville, we were carrying on a broadcasting system of farming and got returns from that type of farming. It included one field of barley, which was to be used for grain for livestock, and the next year was winter grazing. Normally, crimson clover, only, is used for these studies. Another series was the common, East Tennessee rotation, which consisted of corn, followed by wheat, followed by lespedeza. This was Talbott soil, and it has reasonably good infiltration.

The other plot at Greeneville was kept in sod continually. I might say that, for the first few months, we lost a lot of soil off the one that was kept in sod only, but a great bit of that came from a very small area we had to fill in to get the contour right. That soil moved out pretty quickly. Since that time, there has been very little runoff, very little soil loss, although it is very poor sod. It is a good sod, but it isn't a practical sod from the standpoint of animal production, because it is just wild stuff.

On the plot in corn, or the rotation of corn, followed by wheat and lespedeza, we have not received very heavy water and soil losses. However, the loss is a continuous thing. We are getting a little bit right along.

On the plot where we used the barley one year and the crimson clover another year, we often got into a lot of trouble in preparing for a winter crop on a sloping soil. In our system of farming here in Tennessee, where we have year-round grazing for our livestock, by the use of legumes or grasses (such as our cereal crops or crimson clover, or our various grasses, like rye grass and others, and seed them in the fall of the year), by the time you have that soil just right to give a good stand of crop, it is often the time of year, in the upper section of the State here, when we have some pretty good rains. That is the situation which caught us with our crimson clover there. We have the ground firmed down nicely, crimson clover sowed, and then these hard rains come at just this time and sweep it off.

After working with that type of setup for several years, it rather put me in the position that we had to be rather careful about recommendations for late fall or late summer seedings on our hill lands. As a result, in the Greeneville area, we used alfalfa to a great extent, and found, on most of our soils, that it is easier to grow than red clover. We got to sowing alfalfa in the

SOIL AND WATER MANAGEMENT

spring of the year on our small grain. Just a few months' difference--a few weeks' difference, in fact, between preparation for your winter legume, like crimson clover, and preparation for your small grain crop, makes a lot of difference in the amount of water you may lose from erosion or gullying in these mountain fields. When we take advantage of that and put the barley in, we seldom have any runoff. We never got any runoff from a field of barley, we might say, on those lands there. Then, in the spring of the year we would sow alfalfa in the stand of barley, or oats or wheat, and often get away with it. When we could do that, we were away from our erosion to a great extent.

In some tests that we had here at the Knoxville station, we compared the runoff from plots turned under with ground that had very little vegetable matter yet put into it, and even on this type of soil that we have here along the river, we could see the effects of sod for three years and the difference in the runoff in those plots. If we turned the sod under, we got practically no erosion, no loss of water or silt, for the first year, a little bit more the next year, and even the third year there was less runoff than there was on the others. In the rotation that we used in our normal operations at the Greeneville station--corn, followed by small grain, followed by alfalfa--there has been practically no loss on slopes there, practically up to 25 or 30 percent, no water loss whatsoever throughout that whole period. In one very heavy rain, we had corn in one of the fields that had followed alfalfa sod that had been turned over. There was no soil loss in the field. There was a slight re-location of soil in the field, but it didn't get out.

It seems to me, with no more information than we have--from the standpoint of the farmer's income and being able to carry this large population, from the standpoint of agricultural production--it seems to me that we have not scratched the surface yet as to what can be done from those standpoints by proper fertilization and soil management, and still hold our soil where it is. Just to give you an illustration from this area: Year before last--last summer--the small amount of corn, which was more than we normally carry at the tobacco station at Greeneville, yielded over 100 bushels to the acre. Part of that was on that field which we formerly had in alfalfa sod, and it took a big rain. You might think that there was enormous fertilization, but there has not been. The fertilization in that field would be considered just less than minimum for most of Alabama, but it is a matter of continually increasing the depth of that soil and putting vegetable matter in it.

Let's go just a little bit further in this discussion of our problem of soil management. We will go to the Highland Rim station at Springfield, which is Dickson-Guthrie sandy loam--that type of soil which carries a hard sand.

We can turn those red soils at Greeneville over in the fall of the year with a good sod, and we just forget it so far as erosion is concerned. The next year, we forget it, so far as erosion is concerned, in our small grains, after the row crop. But at Springfield, so far as we have gone--we haven't owned that station as long--you don't turn your soil there in the fall of the year and forget it so far as erosion is concerned. You have to think that over; that is, a lot of those soils there are of the type which, when the first rain comes, or a thaw after freezing, melt that silty material, and then you begin to get erosion.

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The thing that we are particularly interested in making studies of is this: When we get good sod to turn under, are we still going to have the same problem? I want you to keep this in mind: In Robertson County, where the station is located, those farmers have been row-crop farmers for ages, tobacco growers, and growers of small grains, especially wheat. But they have not had sod crops very much. The farm which we crop at the station is no exception to the rule. The soil has practically no vegetable matter in it. We are interested in seeing, as time goes on, if a good sod is turned under there, whether that will keep down erosion as it does at the Knoxville and Greeneville locations.

SOIL AND FERTILIZER INVESTIGATIONS

Howard T. Rogers, Chief, Soils and Fertilizer Research Branch, Tennessee Valley Authority, made a statement to the committee on work in this field. Dr. Rogers based his remarks on an outline of types of projects which he submitted to the committee. This outline follows.

Classification of Projects of the Soils
and
Fertilizer Research Branch

Project Type I. Soil Survey

A. Present status:

1. Work under way in Alabama, Georgia, and Tennessee

B. Nature and purposes of investigations:

1. Classification of the soils in series, types, and phases, according to an accepted scheme of classification established by the USDA Soil Survey Division.
2. Preparation of maps in suitable detail to meet the needs of the agricultural development program.
3. To provide a basis for the extension of the results of fertilizer research and demonstration to similar soil types or soil associations.
4. A guide in determining land-use suitability and in making desired adjustments.

Project Type II. Soil and Fertilizer Investigations

A. Present status:

1. All of the Valley States and Colorado and Iowa

SOIL AND FERTILIZER INVESTIGATIONS

B. Nature and purposes of investigations:

1. Laboratory, greenhouse, and field tests on sources, rates, and placement of TVA-produced materials.
2. The chemical and physical properties of soils as related to response to fertilizer application, crop adaptation, and soil types.
3. Fertility requirements of pasture and forage crops, including the effect of fertilization on chemical composition of herbage.

C. Typical subprojects:

1. Factors affecting phosphate fixation in Alabama soils.
2. Production and management of alfalfa and sericea, with special reference to the value of TVA fertilizer materials to these crops.
3. Dicalcium nitraphosphate studies.
4. Residual effects of different sources of phosphate.
5. Field tests on particle size of fused tricalcium phosphate.
6. Rates, sources, and methods of placement of phosphate and other fertilizers on permanent pasture.
7. Experiments with small grain and other crops on TVA phosphates and other materials labeled with radio-phosphorus.
8. Greenhouse investigations of the relative efficiency of TVA fertilizers and slag.
9. Effects of various rates and phosphate fertilization on irrigated and nonirrigated pastures.
10. Determining the status of sulfur deficiency in the soil as related to types of fertilizers.

Project Type III. Animal Industry and Nutrition

A. Present status:

1. Alabama, Georgia, and North Carolina.

B. Nature and purposes of investigations:

1. Livestock feeding tests.

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2. A comparison of year-round forage production systems for dairy cattle in the mountain area of North Carolina.
3. Biochemical studies of the nutritive value of new forage plants, such as *lespedeza sericea* and fescue grass.

Project Type IV. Soil Erosion and Water Control and Utilization on the Land

A. Present status:

1. North Carolina

B. Nature and purposes of investigations:

1. These studies are intended to measure the effect of pasture management, types of vegetative cover, slope, and soil management practices on erosion losses and the hydrology of agricultural lands.

C. Typical subprojects:

1. Effect of type of vegetation and pasture management on water conservation and utilization in the mountain area of North Carolina.

Project Type V. Special Projects

A. Present status:

1. Tennessee

- (a) Examples: Research on special agricultural readjustment problems in the Douglas Reservoir area.

B. Nature and purposes of investigations:

1. These investigations are conducted in behalf of the vegetable-growing interests that were disturbed by the loss of bottom land in the area of Douglas Dam and other dams in East Tennessee. These studies involve a determination of fertilizer requirements, adapted varieties, rotations, cultural practices, and value of irrigation, with emphasis on horticultural crops in the problem area.

On the subject of watershed studies, the committee made a specific recommendation, which has been reported to the Conference by the Correlating Committee. However, for the record, I shall include the recommendation here. The Committee on Water and Land Use adopted the following motion, made by Director Baker:

That this committee recommend the initiation of more watershed studies similar in design and purpose to the subproject entitled, "Effect of

FARM CLASSIFICATION AND ANALYSIS

Type of Vegetation and Pasture Management on Water Conservation and Utilization in the Mountain Area of North Carolina," in order to determine the facts of the interrelationships of optimum land and water use under various important conditions of soil and cover.

FARM CLASSIFICATION AND ANALYSIS

J. W. Moon, Assistant Director, Division of Agricultural Relations, Tennessee Valley Authority, made a statement to the committee on the subject of farm classification and analysis. Mr. Moon said, in part:

So far as our program is concerned, the cooperative program, the farm unit is a common thing. We have something in the neighborhood of a quarter million farms in the Valley. A great deal of our work in agriculture up to this time has been along the lines under discussion. For 25 years, I was working with soils. If all of our work were concerned only with specialities, I don't think we would have to worry too much about having a quarter of a million farms here to deal with, but the minute we undertake to deal with these farms as units, then we have got to do something in the way of farm classification. So far as I have been able to see, it is just about as bad to proceed with the sort of program we have without classifying the farm as it would be to go up here to Knox High, where they have 1500 or 2000 students, and teach those students one at a time without ever putting them into classes. Now, that is how important I think this job of farm classification is, here or anywhere else where you have a program dealing with farm units.

I don't profess to know how to classify farms, the best way, the right way. I presume that we have quite a bit to learn about it. We are working at it, and I hope that we will continue to work at it, whether we complete a satisfactory system of farm classification and analysis. If our work is to be concerned with farm units, I think we will establish a farm classification sooner or later. Somebody will. It must be done. There is quite a difference of opinion as to how farms should be classified; in the first place, what we should take for the basis of the classification. That, to me, is very fundamental in any classification. I am about to come to the conclusion that we might do well to classify farms on the basis of natural farm resources themselves. That would mean soils, forests, and size of farms, assuming, of course, that the natural vegetation and climate are fairly uniform. The reason I think this is: So far as I have been able to see, one of the main reasons for science in agriculture is to develop a sound basis on which we can do long-time planning and make sound predictions. I can't say that that is the whole reason, but it is an awfully important part of the reason, the justification for science in agriculture, so far as I can see.

Here in the Valley, where we have, fortunately, I think, 70 percent of the Valley already covered with modern soil surveys and where we

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are working with these individual farms, I think we have two potential levels on which we can accumulate information for long-time planning or for making sound predictions. Here is what I mean. The first level, lower level, would be on the soil type, and that is simply this, to study the production of crops on each important soil until we accumulate enough data so that we can predict what the average expected yields are for the crop on that soil under a physically defined level of management. To me it is awfully fundamental to do this.

I don't see why, with a sound farm classification on the basis of the principal resources, we cannot have a sound one that is relatively easily made. If we had our farms classified meaningfully, just on the basis of size and the kind of soils and soil pattern, we could take representative farms of these different groups and carry on real studies of these over a period of 10 or 15 years. Here we would have farms that have just about the same physical resources, this one on one level of farm management, and the other on another level, and another on another level, etc., and eventually come out with an answer as to what can be expected of each of these farms in a group, if managed on level A, managed on level B, managed on level C, etc.

There is also the matter of the pilot research farm. That is what we call it, but that isn't as important to me as what it is. A pilot farm is a farm on which you are trying out a combination of practices. It is risky, very risky, and you wouldn't want a man to take that chance. First of all, that. Second, that the management of that farm is done directly by one or more scientists, or certainly in the main, if you see what I mean. I think it is less than a farm, because, first of all, your farmer's managerial ability is out on these particular farms. A complete physical farm is what you have; but you haven't got a complete and social and economic farm. That is what I should like to call a pilot research farm, but everybody doesn't agree with me.

As a matter of fact, it seems to me that we would have to have something like these pilot farms, test-demonstrations farms, and maybe special study, test-demonstration farms, so that, when we once get our farm classification, we can get in there with farms distributed properly, in order, actually, as I put it, to see how homogenous the farm group is and what the group is.

In order to explore this subject further, the Committee on Water and Land Use set up a special committee, to be known as the "Committee on Method and Procedure for Farm Classification and Analysis in the Tennessee Valley." Mr. Samuel W. Atkins and Mr. Lester E. Odom, U. S. Department of Agriculture, Mr. Kenneth J. Seigworth and Mr. J. W. Moon, Tennessee Valley Authority, and Mr. H. J. Bonser, University of Tennessee, were appointed on this committee. Mr. Atkins agreed to serve as chairman. The special committee was requested to prepare and submit a report to the Committee on Water and Land Use on the following items:

1. Review the methods employed in the farm classification and analysis study in Haywood County, North Carolina, and suggest such changes or improvements in method as the committee may find to be desirable.

PRODUCTION GOALS

2. On the basis of the methods proposed, suggest a procedure for applying the method on a regional basis in the Tennessee Valley.

The special committee has not yet submitted its report.

USDA ESTIMATES OF PRODUCTION GOALS

There was laid before the Committee on Water and Land Use a letter of September 12, 1949, assigning to that committee responsibility for further exploration of the subject of USDA estimates of production goals in the Tennessee Valley.

The committee postponed consideration of this subject.

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of
HARRY A. CURTIS
Director, Tennessee Valley Authority

Chairman Schaub (introducing Director Curtis): From time to time, over the years, the speaker of this occasion has met with us; and I think we were all very much delighted when, in February 1949, he was appointed as a member of the Board of Directors of TVA. We are fortunate today to have Dr. Curtis with us; and I am sure we are going to be very much interested in whatever he has to say. It gives me real pleasure at this time to present to you Dr. Harry A. Curtis, of the Tennessee Valley Authority.

Director Curtis: In 1933, I joined the TVA as director of their chemical engineering activities, and in the course of the next 5 years, I hired a good many good men, such as Jack Walthall, who is here, and Charlie Young, who would like to be here, and others; presently I found they had no need for me, so I went to Missouri for a dozen years, and finally came back in February 1949 as a director. Of course, I was very much interested in finding out what had happened in the 12 years I had been gone. I wanted to know all about TVA. I soon discovered that there was a conspiracy, headed by George Gant, General Manager, to prevent the directors from finding out anything. The theory is that if the directors are not bothered with the details of all that is going on, they will have a lot of time to think about matters and to reach wise decisions on matters of policy. I find it very difficult to think about things unless I have some facts; and so I started out to find the facts about TVA, what it was doing, and why. I have run poor George Gant nearly crazy during this operation, and I have made a nuisance of myself in various offices of TVA, and I am very sorry I can only work that way.

Several months ago I sent a little note up to Neil Bass. I said, "Neil, I have been looking over a lot of TVA documents, and again and again and again I come to the phrase, watershed protection. Now, please tell me just what you mean by 'watershed protection.'" I got back right away a very nice reply, which I sent back with the complaint: "Neil, you haven't said anything. You merely repeat that you mean 'watershed protection.'" Then Neil sent the inquiry out to his staff, and he got back about 15 or 20 different definitions of watershed

9/ See text, p. 41.

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protection. Those definitions differed a great deal. Neil showed them to me and then took them back to make a synthesis. That was 5 or 6 months ago, and I haven't got the answer yet as to what Neil means when he talks about watershed protection.

When I was with the TVA in charge of the chemical engineering staff, I was thrown in contact with some other phases of the work, particularly the agricultural work, mostly through McAmis here; I was very much interested, having been born and raised on a farm, a cattle ranch. I saw the dams going up and power being distributed, and TVA mixed up in law suits, and so on and so forth. When I came back this time again, I got around to the question of watershed protection and the agricultural program of TVA, and when I finally realized that I wasn't going to get the answer from Neil as to watershed protection, I started out to find out what I could about the relationship of the watershed to the rainfall and to the flow of water in the streams. I read many books and a large number of TVA reports, and I talked with a great many TVA people; out of all this I finally got to the place where it appeared worth while to set down for my own use the way the picture looks to me; then I would show the report to the wolves of TVA and see what they would do with it. They are still tearing the thing up, but presently I am hoping to get out of this venture of mine a statement of the relationship of the watershed to the rainfall and flow in the river to which we can agree and out of that perhaps we shall see where we need more information. I have found a lot of places where the answers are not available to the questions I asked; in some cases, it has been a failure of minds to agree, particularly between the engineering group and agricultural group, which is not unnatural—Mac and I have been quarreling for the last 15 years. I want to present some of my findings here today. A good many of the things I shall say are old matters to you. Some of them may sound a bit naive, and I apologize in the beginning for anything that falls in that class.

Let me say a word, first, about the overall situation with respect to rainfall in the Valley. It comes as a surprise to most people to know that of all the water that falls upon the Tennessee watershed, less than half leaves by way of the rivers. Over a long period of years, the average rainfall is 51 inches. If, then, you take a similarly long record, say 50 years, of the water flow at the mouth of the Tennessee River, you come out with approximately 65,000 cubic feet per second. Translating that back into rainfall, it appears that the watershed is taking care of 58 percent of the total rainfall on the average, and the river is taking out the other 42 percent. In other words, here is a watershed which prevents 58 percent of the rainfall, on the average, from ever getting into the river. Therefore, it is nonsense to say that the watershed has no relationship to the flow of the river; I have heard some of the engineers make that statement, but obviously that cannot be true if the watershed is taking 58 percent of the total. There is also this to consider: The rainfall records show that any month in the year may be a very wet month or a very dry month as compared with the normal average; and there is a variation from year to year from the 51 inches. It may go 25 percent below or 25 percent above that. That makes a very big variation. It is characteristic of the watershed that it takes its toll, no matter whether there is a lot of rain or a little rain. In other words, the watershed takes approximately 30 inches of the 51, if there is 51, but if there is only 47, the watershed still takes approximately 30 and leaves the shortage in the rivers. That is one reason why there is such an enormous variation in the flow of the rivers. During World War I,

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I was at Wilson Dam, where the nitrate plants were under construction. I used to go to the shoals and cross the river by jumping from one big rock to another, the water was so low in the river.

As I came to study this question of the relationship of the watershed to stream flow, I realized that it is a very complex relationship. I mentioned the variation in rainfall. Occasionally we have a big rain that goes all over the Valley. On the question as to where the water comes from, someone said to me, "Well, if it evaporates from the watershed in one part, of course it will be distributed to another part." I looked into that question and find that such is not the case. Very little of the water that evaporates out of the Valley falls again in the Valley. Practically all of the water comes from outside the Tennessee Valley. There is a very complex relationship that exists between the watershed and the streams; I have attempted to analyze some of the complex features of that relationship.

Now, I want you to come out with me in the rain. Some folks don't know enough to come in out of the rain. I have seen Mac (Mr. McAmis) breezing around his farm in the midst of a big rain, and I have done it myself, to see what is happening outdoors. There are a lot of things one may see by merely looking around. One of the first things that happen when the rain starts is that all the vegetation cover of the watershed gets wet. That is not much of an observation, is it? But when you stop to think of it in connection with the things we are now considering, the vegetative cover of the watershed appears as one of the natural reservoirs in the watershed. It has all the characteristics of the artificial reservoirs. In other words, it receives water, retains that water for a period of time, and then loses the water. It loses it by evaporation, of course. When you try to find out how much water is involved, you run into a very difficult problem. I have read many text books and papers and thousands of articles in trying to find out how much it amounts to. My guess is that, on the average, perhaps seven and one-half inches of the rainfall on the Tennessee Valley is caught in this natural reservoir and evaporated back into the air. Of course, all the water that the watershed doesn't deliver to the streams eventually goes back into the air. It has nowhere else to go. Only 42 percent goes into the rivers while 58 percent goes back into the air.

As you wander around in the rain, you observe a number of other things besides the wetting of vegetation. You see the water falling on the bare ground and note that at first it sinks in pretty rapidly. Present, the infiltration begins to slow up; it doesn't sink in well any more. On a grazed pasture you see other things. The idea that a cover crop will keep water from eroding the land is sound, but it may not increase infiltration, which depends on a lot of other conditions. I have seen many a pasture that has been well grazed and the soil has been compacted, and looking at it reminded me of one of the old thatched roofs in England that I have watched during a rainstorm. So there are factors other than cover crops to be considered. If you go into a forested area, you may be surprised to note how little surface runoff occurs. You may observe a number of things by merely walking around in the rain, as some of us have done.

When you come to look a little more closely into the situation during a rain, you find a lot of other things happening; at least, I did. When the rain soaks into the soil, the soil ties up a part of the water. The water that is

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in the soil during a rain and for a little while afterward is in three different categories. In the first place there is the hygroscopic water of the soil. The soil hangs onto the hygroscopic water very tightly. The hygroscopic water of the soil doesn't vary much during a season. It will change a little, but not a great deal. Another type of water in the soil is what we call the capillary water, the water that forms films between the soil particles. This type of water will vary in amount. It is the water from which plants get their supply. The third category of the water in the soil is in the larger pores of the soil, the macrospores, the root channels, etc., and this water goes on down the soil to the water table. In order to get a high rate of infiltration, we must have conditions favorable at the surface for the initial soaking in of the water, and then favorable condition for percolation through the soil. The soil, then, hangs onto a part of the water, the hygroscopic and the capillary water, and is water that never gets into the streams. It represents a large toll. The soil provides a natural reservoir that receives water, holds it for awhile, and then loses it; loses it partly by evaporation from the surface, but very largely by a special kind of evaporation which involves water movement through vegetation and transpiration from the leaves of the plants.

If you are out in this rainstorm, you will note that if the rain be gentle, it may continue to sink into the soil indefinitely. If it be a bare soil, you may observe that after the rain has begun infiltration slows up and water begins to run off over the surface. It will always run off over the surface if the rainfall is intense enough, and most of the surface runoff that occurs comes during those periods when the rainfall is intense. Obviously, whenever the rate of rainfall exceeds the rate of infiltration, the rest of the water is going to run off over the surface. The water running off over the surface is also a natural reservoir. It holds a certain amount of water; it fills and empties, just as the vegetation reservoir does, many times during the year. Of prime interest to agriculture and, of course, to the streams, is to see that the water in the surface runoff meets a lot of resistance so that it doesn't tear up the land; i.e., it doesn't run down too fast. We want to retard the rate of runoff and increase the time for infiltration. The water that percolates down through the soil finally gets to the underground reservoir, and we have there another type of natural reservoir on the watershed.

We have, also, a fifth type, but is rather unimportant in the whole picture. The vegetation growing on the watershed, the trees and plants of various kinds, all take up a lot of water through their roots. A part of that water is used chemically to build up the structure of the plants. Another part has to be there as water in order that the plant may carry out its life functions. That ties up water for a short period in the case of annuals, and for a longer period in the case of trees. I made some calculations as to how much water on the watershed is tied up in the living vegetation. It is only a very small fraction of an inch of rainfall. The quantity is very large when expressed as tons of water, but in terms of annual rainfall it is only a small fraction of an inch. The natural reservoir afforded by the living vegetation is relatively unimportant.

I have mentioned the hygroscopic and the capillary water in the soil. The soil physicists have invented a scale, a pF scale they call it, something like the pH scale, by which they express the intensity with which a soil hangs onto water. I have said that the plants can't utilize the hygroscopic water. They can't get

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even all of the capillary water because, as all of you know, plants wither when the water in the soil falls below a certain level. It falls below that level before all the capillary water has been used up, but all the water plants do get is from the capillary water in the soil.

We have mentioned five natural reservoirs that are operative on the watershed, namely, the vegetation surface reservoir, the soil reservoir, the surface runoff reservoir, the reservoir in living plants, and the underground reservoir. Of these only the water from the surface runoff reservoir and from the underground reservoir reaches the streams. The sixth type of reservoir is the artificial reservoir. At the present time, TVA owns or controls the operation of 30 artificial reservoirs in the Valley. These reservoirs were built for flood control; they provide for navigation, and they provide for power generation.

The TVA has interested itself in what happens on the watershed both from the standpoint of agriculture and the people that live on the watershed, and because the watershed is closely related to the stream flow. We are recommending that this or that be done on the watershed. When it comes to the farms, what happens on the farms, TVA's interest is shared with other organizations who are more directly charged with that phase of the problem than is the TVA; but when it comes to the relation of the watershed to the stream flow, TVA has a special and unique interest. Therefore, I am hoping that out of the studies we have made, it will be possible for the TVA to find out which of the proposed land use changes are desirable agriculturally and, from such a list select the ones that are particularly of TVA interest because they affect the stream flow. The silting of the TVA reservoirs has been mentioned. It is true that it will be a thousand years or thousands of years before the TVA reservoirs are filled up with silt, but the period is shorter until the silt in the reservoir begins to affect the volume of storage. In the silting of the reservoirs, we have an unusual situation in the Valley. In general, it is not like the western situation. In the Valley, about 54 percent of the whole watershed is in forest and farm woodlands. That is a big help in the silting problem. In the TVA reservoirs there is a large storage for silt, and it will be a hundred years or so before there will be any appreciable decrease of the water storage capacity. Of the total 22 million acre-feet of storage in all the reservoirs, between 7 and 8 million acre-feet represents the normal fluctuation between the low-pool level and the high-pool level. The artificial reservoirs are operated as multiple-purpose reservoirs. I have indicated that they serve for flood control, navigation, and power development. They are operated, and must be operated, to provide flood control. Navigation is provided almost automatically as a result of having the dams and reservoirs. During the period from December to April major storms are likely to sweep over the Valley, and the reservoir levels are deliberately held low, down as near low-pool level as possible. There is a regular schedule for operating the dams from month to month so that if a flood comes along there will be a tremendous volume of storage available. Toward the end of the flood season, April, the reservoirs are allowed to fill, because most of the period during which heavy rains and floods are likely to come is past. They never fill up purposely beyond the point where there isn't any storage left. On each of the dams there are emergency flood gates and along such reservoirs as Kentucky there are areas reserved for flooding during the rainy season. The emergency flood storage capacity, even when

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the reservoirs are normally full, equals almost the useful storage of the reservoirs.

I was interested to see if I could get some figure on what these various natural and artificial reservoirs amount to, in the first place, in capacity, and, in the second place, in yearly input and output. Seven and one-half inches of rainfall is my guess as to what the vegetation reservoirs may take care of. The living material on the watershed takes care of only a fraction of an inch, so far as I can figure. The estimate for the soil reservoir presents a difficult problem. The soil reservoir loses water from the surface of the soil and through the transpiration of living vegetation. Probably more goes out of that soil reservoir through transpiration than goes out by evaporation from the surface. Just what proportion of the total loss each process accounts for is uncertain. We have water gages of various sorts at many points in the watershed and from them we may eventually get a pretty good picture of what the storage capacity of this soil reservoir may be. I suspect it is going to show that about six inches of rainfall are stored in the soil reservoir. That water doesn't get into the streams at all. We do not know very much about the capacity of the underground reservoir. We know much more about how much goes in and goes out, but the capacity is a thing that is almost impossible to measure. We know what comes out and what goes in; i.e., we know the fluctuation. The character of the underground reservoir varies enormously over the watershed. In some of the individual watersheds, the annual fluctuation may be as low as three inches of rainfall. In the upper ends of the watershed, there are places where it goes up as far as eight. I am told that on the average, at the beginning of the dry season, we can count on three or four inches of water available in that underground reservoir. During the first month, most of it will come out; in the next month, another fraction; and in the third month, nearly all that is left. So the underground reservoir is fairly dry at the end of about three months if not replenished.

It is important, from the standpoint of how the water flows in the streams, that as the normal dry season approaches, we have the artificial reservoirs just as near high-pool level as possible. If we have a good season, such will be the situation; otherwise not. We have in the artificial reservoirs, then, a certain amount of water stored, and it can be released at will. There is where the artificial has it over the natural reservoir, because we can control, quite easily, the release of water from the artificial reservoirs, whereas the natural ones cannot be controlled. It would be ideal if we could have the artificial reservoirs at the high-pool level as the dry season comes on. We would also like to have the underground reservoir full also, because during the next three months the streams are going to get mighty little of the rainfall.

The river hydrographs show that the flow of the river is high during January, February, and March, and then begins to decrease and goes right on decreasing through the month of July, showing little or no rise due to the heavy rains that usually come in July. The rainiest month of the year doesn't give anything like a corresponding increase in the flow in the streams. In July, when the heavy rain normally comes, the soil reservoir is likely to be far below its field capacity and will take up rain very readily. During that time of the year vegetation will take an enormous toll, so that during the periods of the year when we should like to have water getting into the reservoirs, we have the conditions under which the greatest toll is taken by the watershed.

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When you come to the question of what can be done about the thing, it might seem at first that the soil reservoir didn't have very much to do with the stream flow, in view of the fact that no water from the soil reservoir gets into the streams. It all evaporates from the surface or goes out through plants. However, don't forget that the underground reservoir can receive water only as it percolates through the soil reservoir. If the soil reservoir is below its field capacity, little or no water will get through it, and that is just what happens during some parts of the year. The water doesn't get through the soil reservoir into the underground.

In view of all these things, what, if anything, can be done with reference to changes in land use? The first criterion to be met is that the proposed change must be favorable to agriculture. TVA cannot for a moment consider changes from the standpoint of stream flow if such changes are not favorable to agriculture; at least, acceptable to agriculture. Some of the proposed changes which might favorably affect the streams are such as to be desirable agriculturally. We have talked about soil erosion; and more has been accomplished in this line than in most others. It has been said that we have plenty of room in the bottom of the TVA reservoirs for silt, but that is not telling the whole story. We can store all the top soil in the bottom of the reservoirs, but no one should argue that it is a good place for the top soil of the Tennessee Valley. We don't want muddy waters in the reservoirs and streams anyhow. There are a lot of fish that live in the water; there are a lot of people who use the lakes for recreation; some towns draw their water supplies from the rivers; industrial concerns use water from the reservoirs and the rivers; so that TVA, as custodian of the reservoirs and dams and streams has every reason in the world for wishing that the land were kept back where it belongs. Even though we can store it, we don't want it there; so that the agricultural desirability of preventing erosion and the TVA particular interest in erosion tie right in together. Anything that can be done on the watershed that will reduce erosion is in the interest of agriculture and in the interest of stream flow.

I want to mention at this point one thing before I forget it. Extension Service, the PMA, the Soil Conservation Service, and the Land-Grant Colleges have been pretty much preoccupied with the farmer and the things that happen on the farm. Down in the streams, if some outfit built a dam and got electricity, that electricity went to the towns or the industries, and mighty little of it ever got to the farms. When TVA came into this Valley, 3 percent of the farms had electricity. Now approximately 70 percent of the farms are electrified. In view of this changed situation, you can no longer say that people who are concerned with life on the farm are unconcerned about what happens in the stream. Of course, TVA would be glad to have the agricultural folks prosperous, if only because they are power customers. They are one of our chief class of customers, so we hope they will be able to continue to buy electricity. The point I am trying to make is that electricity, like autos, has become such an integral part of the operation of the farm that the Land-Grant Colleges and all the folks who are concerned with agriculture in the Valley do have a very direct and obvious interest in what happens in the streams. I don't believe that they can leave electricity out of the picture any longer.

Another thing that seems very obvious is that it would be desirable to increase the rate of infiltration because water from the underground reservoir

ADDRESS

will serve to feed the streams during the dry period. Of course, it is desirable from an agricultural standpoint to have the soil reservoirs as nearly full as possible. Here, again, the agriculturist's interest in having that soil reservoir at a high level coincides with the TVA's interest in having water get down through that soil reservoir into the underground reservoir, where it will come out into the streams. We do not have, in my opinion, sufficient information as to what can be done on the land to increase the rates of infiltration and the time of infiltration. We know qualitatively a lot of things, but we haven't very good quantitative information. I am aware that experiments have been made in which runoff was measured, but, with reference to specific farm practices, we lack a good deal of information. I was interested in Director Chance's saying this morning that turning under a sod crop helps infiltration. I read an article last week where it was pointed out the effect of the cover crop was greater in the succeeding years when it was turned under than it was in the year that it was growing. Evidently the presence of organic matter in the soil maintains suitable condition for infiltration.

Mention has been made of the small watershed. TVA is turning particular attention to the small watersheds because there, we believe, is the opportunity to accomplish, in the early future, certain very desirable things. In the Chestee watershed, for instance, three years out of five, crops are damaged; one year out of five they are completely ruined in all the bottomlands of the Chestee valley. We sent our engineers down there, and they said, yes, we can open up the channel and let the water get through, but that isn't going to solve the problem because the hillsides are going to wash down in the channel again and in a few years the channel will be plugged again, and we shall have the job to do over. They won't touch the channel in the Chestee until the agriculture people keep the soil back on the hills, then the engineers can open up the channel and let the water that does come down get away instead of spreading over the bottomlands. The problems of agriculture and engineering on the streams tie in together. The Chestee watershed has been selected by the TVA for an intensive study of some of these problems. If we go into the Chestee watershed now and we do what seems desirable with respect to forestry, on the advice of competent folk, and we get a meeting of minds as to what is the best thing to do with reference to cover crops, pastures, etc., in a few years we shall have an overall result, but we will not know what part of the result was due to one of the things done and what part was due to another. In order to be able to apply the results obtained to other watersheds, it will be necessary to get a lot of information on which to break down the overall results. We have planned in our program for Chestee to set up some quantitative experiments that will help in interpreting the results and will make the results useful in handling other watersheds.

I have tried to present some of the general features of the relationship of a watershed to its streams. I think we are just at the beginning of being able to decide what things should be done in the way of land use. We have run into a lot of problems where additional research is needed, research on a quantitative scale on a small plot and research on a semiquantitative scale on a larger plot, and perhaps research, in some cases, on a small watershed. I am hoping we can arrive at a statement to which we will all agree as to what the situation is on the watershed. Then we can select certain things where we lack the knowledge, and go after that knowledge and then build up a program that is a rational one, or one that is as rational as these things can be. It is a tremendous

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job, obviously it is, but maybe we can arrive at a better situation with respect to land use than we now have in the watershed. In the 30 reservoirs that TVA controls, the normally used storage amounts to three and six-tenths inches of rainfall. In other words, the underground reservoir is as large, or possibly larger, than the artificial reservoirs. If we are going to increase the effectiveness of the artificial reservoirs in generating cheap power and getting more of it out on the farms where it can be used so profitably, it is important to see what can be done in respect to the underground reservoir. That ties in immediately with the soil reservoir, and it ties in with the transpiration of plants, and with problems of agriculture and soil science. I am hopeful that if we keep on we can tie all the factors together and finally arrive at a program that is more rational than any that has been devised to date.

REPORT OF COMMITTEE^{10/}
 ON
 RURAL FACILITIES, SERVICES, AND INDUSTRY
 by
 R. E. McArdle, Chairman^{11/}

The Committee on Rural Facilities, Services, and Industry met in Knoxville, Tennessee, on January 11, 1950. Actions taken by the committee in regard to terms of its members and date of annual meeting have been reported to the Conference by the Correlating Committee.

Since this was the first meeting of the committee, an effort was made to obtain a general picture of the principal fields of interest of the committee. For that reason, a number of people who are particularly informed in subject-matter fields with which the committee will be concerned were invited to meet with us and present brief statements on these subjects. In this report, we are attempting to present to the Conference a digest of the material presented to the committee at its meeting.

RURAL RECREATION RESOURCE DEVELOPMENT

Types of Public Resources and Facilities

R. M. Howes, Chief, Recreation Branch, Division of Regional Studies, Tennessee Valley Authority, made a statement to the committee on types of public resources and facilities. Mr. Howes stated, in part:

10/ See text, p. 41.

11/ In the absence of Chairman McArdle, the report of the Committee on Rural Facilities, Services, and Industry was presented by Director H. N. Young.

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Few sections of the United States are basically as well endowed as is the Tennessee Valley with the natural resources of recreation.

Recent developments in the region are bringing changes to established recreation patterns--some good, others bad. Improved communication and transportation have removed barriers with the result that former centers of rural recreation have disappeared. Consolidation of rural schools--unquestionably bringing improved education--has destroyed the cohesiveness of many small communities. The automobile and roadside "honky-tonks," while bringing city and country closer together, have also produced a sort of hybrid form of recreation opportunity that is neither urban nor rural and frequently combines only the worst features of both without compensating benefits. Continued migration of rural people from the region creates the impression that rural living is still deficient in recreation as in adequate economic opportunities, medical care, schools, and libraries.

While admitting some grounds for such a conclusion, I find many reasons for believing firmly that recreation resources and facilities for rural people are much more adequate than a superficial examination might lead us to suspect. Rural recreation problems are receiving increasing attention from the church, the school, and at all levels of government.

Within the Tennessee Valley, both the Extension Service and the National Recreation Association are doing effective work. Each of the Valley States is likewise conducting recreation programs which compare favorably with those of States elsewhere in the Nation. Tennessee, with TVA assistance, was among the first States to initiate a community recreation advisory service. Jefferson County, Kentucky, is conducting what is probably the outstanding rural recreation program in the United States. Twelve Valley counties, and 13 cities, most of them small, have leased TVA property for recreation purposes.

TVA has endeavored to fit its own recreation program into those of other state and federal agencies working in the Valley in ways which will strengthen the efforts of these agencies. Memoranda of agreement with the planning and conservation agencies in Alabama, Kentucky, North Carolina, and Tennessee have provided an effective framework within which the recreation resources represented in TVA lakes are finding their way into the hands of state and local public agencies, quasi-public organizations, and private individuals for use and development. As of January 1, 1949, the investment of these groups in recreation facilities and equipment on TVA lakes and lake shores totaled nearly 16 million dollars, an increase of nearly 3 million dollars over the previous year. Our current survey, just initiated, will undoubtedly show comparable gains during the past year. In 1948 we estimated that 16 million persons enjoyed a day's recreation activity at TVA dams and reservoirs. As you know, the dams attract visitors from all quarters of the United States and many foreign countries, but the use being made of our lakes for fishing and boating and our lake shores for camping and picnicking comes largely from the immediate region.

RURAL RECREATION RESOURCE DEVELOPMENT

Fish and Game Resources

A. H. Wiebe, Chief, Fish and Game Branch, Division of Forestry Relations, Tennessee Valley Authority, made a statement to the committee on fish and game resources. Dr. Wiebe said, in part:

Fish

The maximum contribution to fishing possibilities is the creation of new fishing waters. Regulating the fishery of already existing waters may stretch the supply and afford better distribution, but the creation of new waters increases the total amount of fishing available. The TVA has created a half million acres of new fishing water plus a variable amount of fishing within the surcharge zone of some of the impoundments. Not only has the TVA program resulted in additional water acreage but conditions for existence in the impoundments are better than in the unimpounded river. This is shown by the fact that the increase in fishing intensity exceeds by many times the increase in water surface. On Norris Reservoir the fishing intensity is at least a hundred-fold that of the original river, yet the surface of Norris Reservoir is only ten times the area of the old river channel. Deeper, cooler water and more stable levels are the reasons.

No over-all estimate of the fishing possibilities is available. However, such partial estimates as we have are very promising.

The TVA lakes in Alabama supported over a million fishing trips in 1940. The Guntersville tailwater provided 166,710 fishing trips, with a total catch of 895,934 pounds during 1949 fiscal year. All tailwaters combined supported 657,054 trips. (This total may well reach the million mark during 1950 fiscal year.) In 1944 Norris Reservoir yielded the following catch: 99,173 black bass, 7,676 walleye, 10,720 sauger, 177,252 crappie, 8,945 bluegill, 3,053 miscellaneous.

The extent of fishing in TVA water is reflected in the sale of licenses by the Tennessee Game and Fish Commission.

<u>Item</u>	<u>1934</u>	<u>Year</u>	<u>1947</u>
Combined hunting and fishing licenses	\$80,000		\$470,000
Nonresident licenses	1,600		18,000 (annual fishing)
Nonresident trips			59,000
Resident trips			13,000
	\$81,600		\$560,000

Most of this increase has resulted from (1) new fishing waters, and (2) year-round fishing.

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Waterfowl

Reservoirs, generally speaking, are built for use, which means unstable water levels. These fluctuations prevent the growth and/or utilization of aquatic waterfowl food. In the Tennessee Valley at least the most extensive drawdown is for flood control, which occurs during the winter when the birds are in the Valley. Hence, all other fluctuations may be discounted in considering the reservoirs as a habitat for ducks and geese. (The Tennessee Valley is of no significance as a nesting area.) Experience in the Valley has shown that any waterfowl development, that is to say, the development of feeding areas, must be independent of the main reservoir. This food for ducks and geese must and can be produced on dry land either within the drawdown zone or at even higher elevation. It is because this lesson has been learned that much progress is being made in the development of waterfowl feeding areas in the Tennessee Valley. The Fish and Wildlife Service and the States of Alabama and Tennessee are making rapid progress and some development work has been started in Kentucky.

Accomplishments: 600,000 acres of water attract waterfowl

100,000 (50-50 basis) of land and water in federal and state refuges.
(Important as wintering grounds.)

36,000 acres (including 22,000 acres of land usable for food production within and without dykes) under permit to the States for waterfowl use.

All the land used for the waterfowl program was acquired incidental to reservoir construction and none was purchased specifically for the benefit of wildlife.

In early December 1948, over 140,000 ducks and 15,000 geese were counted on Kentucky, Wheeler, Guntersville, and Chickamauga Reservoirs. (There were at least some ducks on the other reservoirs.) Early in December 1949, 52,000 ducks in Wheeler Refuge and 100,000 in the midsection of Kentucky Reservoir.

On opening day, December 10, 1948, at least 15,000 ducks were in the West Sandy area (Kentucky) and hunters bagged 500 that day. This 3,000-acre area provided 1,800 man-days of hunting and a kill of 2.2 ducks per trip.

The Hiwassee Island State Game Refuge (Chickamauga Reservoir) when established in 1940 accommodated 20 Canada geese. Currently (1949-50) this goose population numbers in excess of 5,000 birds.

An estimated 350 geese were killed on Chickamauga Reservoir during the 1948 season.

Because of the existence of Kentucky Reservoir, the number of waterfowl in the area between the Tennessee and Mississippi Rivers--especially in

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the Obion River section--has increased greatly.

The Tennessee Valley is rapidly becoming a major wintering area for the waterfowl of the Mississippi Flyway because of (1) the possibilities created through the TVA development, (2) deterioration of coastal areas, and (3) lack of development along the lower Mississippi River.

The Tennessee Valley will never be able to provide all the ducks and geese desired by the hunters or the wintering facilities called for by the conservationist but the opportunities for shooting waterfowl as well as the possibility for wintering birds have been greatly improved since the advent of TVA. Much development work remains to be done.

Most of the agricultural land used for waterfowl still remains a part of the local agricultural economy--share cropping.

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Development of Tennessee River Waterway in Relation to Agriculture in the Tennessee Valley

A. J. Wagner, Chief, Navigation and Transportation Branch, Division of Regional Studies, Tennessee Valley Authority, made a statement to the committee on development of Tennessee River waterway in relation to agriculture in the Tennessee Valley. Mr. Wagner's statement follows:

The 9-foot navigation channel on the Tennessee River has now been essentially completed and is in active transportation service. This 630-mile waterway, extending from Knoxville to Paducah, is an integral part of the whole Mississippi River system of approximately 10,000 miles of navigable waters. The same barges and towboats that operate from New Orleans and Texas gulf ports to Pittsburgh, Minneapolis, and Chicago can--and many of them do--come up the Tennessee River as well.

The inland waterway route offers particularly direct and effective transportation between points in the Tennessee Valley, on the one hand, and points in the agricultural Midwest on the Illinois, Upper Mississippi, and Missouri Rivers, on the other hand.

Approximately 20 barge lines are now operating on the Tennessee River. There are five general public-use terminals at the major port cities offering service to the general public; and many more privately owned terminals serving the needs of large individual shippers. Thus all of the physical facilities needed for full transportation use of the Tennessee River are now present.

Like electric power, Tennessee River barge transportation should not be regarded as an end in itself, but rather as one more powerful

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tool which people in the Valley can use in the further agricultural and industrial development of this region. It is important to those interested in the Valley's agriculture as a new addition to our total transportation system. It should not be considered as a separate and detached transportation facility, but rather as a new segment of the total system which lends the system increased versatility and greater efficiency.

The new waterway is already being used increasingly each year. In 1948 it carried about 446 million ton-miles of traffic and saved shippers approximately 4 million dollars on their transportation bills. This traffic volume is more than 13 times the 1933 volume. The totals for 1949 are not yet complete but will clearly be higher than the 1948 figures. This upward trend in traffic volume and transportation savings is expected to continue for a number of years and should ultimately be well over double the present figures.

Just at the present time barge transportation looms even more important than ever in the transportation pictures. As you may know, rail transportation rates on the average have increased about 57 percent since 1946. Barge rates have increased too, but only about 35 percent, so that the margin of saving favoring barge shipment has widened considerably in the past years.

Now let's examine some of the more specific relationships of Tennessee River transportation to agriculture. The most direct and readily discernible point of contact at the present time lies in the barge shipment of grain from farms of the Midwest into the ports of Decatur, Guntersville, Chattanooga, and Knoxville in the Tennessee Valley.

The Tennessee Valley region in general now consumes more grain than it produces. A large part of the deficiency is supplied by the surplus grain-producing farms of the Midwest. At the present time about 100,000 tons per year is moving into the region by barge and indications are that a considerable increase can be expected in the future. Transportation savings are as much as \$4 per ton, which is about one-third of the total all-rail transportation charge. (Along the Illinois waterway farmers reportedly are paid about five cents per bushel more for grain delivered to river-front terminals for barge shipment beyond than for grain delivered to rail-side elevators for rail shipment beyond.) There are already several new grain elevators, flour and feed mills in the Tennessee Valley, representing a capital investment of about one and one-half million dollars and directly providing several hundred new jobs on the banks of the Tennessee. Valley farmers interested in improved farming practices are growing more livestock and some of the barge-shipped grain is going into feed for poultry and livestock. These developments have contributed to the expansion of business opportunities in the Valley; for example, a new plant in Decatur, Alabama, is now annually processing well over two million dollars' worth of grain-fed chickens raised on local farms.

Farmers are also interested in the fact that the new grain elevators at Guntersville and Decatur have provided a ready market for locally grown grain. At Decatur, for example, in its first year of operation, Alabama Flour Mills reports that it was able to buy only 3000 bushels of locally

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produced grain. But in 1948 it was able to buy 677,000 bushels for which it paid local farmers nearly one and one-half million dollars. At the same time, its receipts by barge, largely from St. Louis, increased nearly three-fold from 1941 to 1948. In addition, feed mills have been established in connection with some of the water-front grain elevators. These mills have provided a further market for other local crops. You probably are familiar, for example, with the plant near Decatur, Alabama, which produces dried and chopped alfalfa, selling some of its product to a feed-mixing plant which is tied in with one of the water-front elevators in Decatur.

Another area of direct effect upon the farmers is in the marketing of forest products. Ties and lumber cut from farm lands near the river have moved to market by barge in considerable volume in the past and continue to do so. This is especially true in that reach of the Tennessee River between Wilson Dam and Paducah. In this area there are several timber landings operated by the counties in which they are located, and a larger number of others which are privately owned and operated. Before the war the producer was paid a premium (generally about 15 cents per tie) for ties delivered to river-bank landings as compared with those brought into rail-loading points. This margin was discontinued during the war, and I am not sure whether it has since been reinstated.

Still another area of particular interest to agriculture is the shipment of farm machinery by barge. This is quite an extensive operation on other rivers and it should ultimately develop on the Tennessee River, although it has not been undertaken here as yet. Manufacturers find it economical to ship all sorts of farm machinery by barge from their assembly plants to water-front warehouses at major distributing centers and then distribute to the retail dealers and others by truck or rail. Savings on farm machinery are quite substantial, amounting in some instances to more than \$10 per ton.

In addition to these specific traffic items, the farmer has the same broad interest in water transportation which any consumer has. About eight percent of our national income, on the average, is spent for transportation; and transportation costs make up about ten percent of the average wholesale of commodities. In some instances, of course, the effect of transportation costs is even much more pronounced. Grain, coal, and fertilizer are good examples. In extreme cases, transportation may account for more than half the delivered price of a given commodity. To the extent that water transportation can be used to reduce transportation costs, the ultimate result must be lower prices for consumers.

Finally, we might consider briefly some of the problems still to be solved in developing full use of Tennessee River barge transportation. Agriculture has a stake in that. Turning again to grain, the saving in transportation costs on shipments moving from a port on the Upper Mississippi, for example, to a port on the Tennessee River and stopping there, are very substantial. However, the margin of saving decreases

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rapidly and soon disappears as the grain is moved on into the Southeast from the river ports by rail. This is because the rail rates away from Tennessee River port cities on grain which arrives at those cities by barge are abnormally high. They are much higher than in the case of grain arriving at the same ports by rail and then moving on to the same destination by rail. There is adequate precedent and reason for securing a reduction, but so far these rail rates on barged grain have not been reduced in the Tennessee Valley because no concerted effort has been made in that direction. This is really only one part of a broader problem of securing better coordination between the various forms of transportation in the interest of developing a more efficient transportation system for our country. It is a problem in which all shippers should have a vital interest.

Another problem is that on the Tennessee River none of the barge lines operate on a regular preannounced schedule and none of them will handle traffic in less than bargeload lots. The development of scheduled service is important because in its absence separate negotiations must be made with a barge line for each proposed shipment. The importance of less-than-bargeload service is apparent when it is understood that normally a minimum bargeload is not less than 200 tons, which is the equivalent of perhaps four to eight rail carloads. Surveys which TVA has made indicate that although a majority of the tonnage prospective for river shipment will move in bargeload lots, about 90 percent of the individual shippers need less-than-bargeload service. In the absence of willingness on the part of privately owned barge lines to provide such service, TVA has urged the passage of legislation now in Congress which would authorize the Federal Barge Lines to operate on the Tennessee River. They are now furnishing this kind of service for shippers on the Mississippi, Missouri, and Warrior Rivers.

The solution of these and many other problems in the transportation field and the development of maximum effective use of the Tennessee River waterway requires a better understanding of the problems and opportunities on the part of shippers and other groups in the Tennessee Valley. This matter of education to the opportunities is a major problem in itself--perhaps the biggest of all. Many of the problems in the whole transportation field will not and cannot be solved until people in larger numbers understand that they are important and become sufficiently convinced that they are willing to turn their attention to finding satisfactory solutions.

Population Trends as Related to Agriculture

Frank D. Alexander, Social Science Analyst, Division of Regional Studies, Tennessee Valley Authority, made a statement to the committee on population trends as related to agriculture. In his discussion, Dr. Alexander presented some general observations about movements of the farm population in response to nonagricultural employment opportunities and increased production per worker as indicative of broad, general forces at work.

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National and Southern Population
Trends as Related to Agriculture

1. The farm population of the Nation decreased by 13.2 percent between 1920 and 1948; that of the South by 10.0 percent during the same period.
2. From 1900 to 1948 the annual rates of increase of the southern farm population that would have resulted from natural increase only have always exceeded those for the Nation's farm population.
3. From 1920 to 1948 the farm population of both the Nation and the South lost by migration from farms in every year of the 28 years except 1932, 1945, and 1946. In 15 of the 25 years in which the farm population of both the Nation and of the South lost because of migration, the percentages of loss were greater for the South than for the Nation.
4. The higher rate of natural increase in the farm population of the South over that of the Nation was sufficiently high that even though the rates of decrease resulting from migration from farms were greater for the South, they were still not high enough to result in a larger rate of farm population decline between 1920 and 1948 than that for the Nation as a whole.
5. Over the years, variations in the volume of migration from farms of the South follow approximately the same pattern as for the Nation as a whole. When Nation-wide nonagricultural employment is high, migration from farms in the South is large; but when non-agricultural employment is low, migration contracts. Since 1920 the years 1945 and 1946 are the only exceptions to this general trend. In those years the large return of soldiers as well as of people from war plants resulted in a large net gain from migration for the farm population of both the Nation and the South. On a percentage basis, it can at least be hypothesized that the "pull" of nonagricultural employment seems to exert more influence on the farm population of the South than on the farm population of the Nation as a whole.
6. Improvements in production have undoubtedly resulted in decreased opportunities for farm employment.

Population Trends in Tennessee Valley
Counties as Related to Agriculture

Dr. Alexander then presented to the committee the results of an examination of certain population trends in the Tennessee Valley. Commenting on these data, Dr. Alexander said:

When these preceding data are related to those discussed previously, it seems that a tentative conclusion is warranted

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that in the Valley area rural-farm population is on the move, leaving farms and in all probability going to the urban centers of the Valley. The latter part of this conclusion cannot be definitely proven but in view of the general tendency of most migrants to make short moves, it would seem to be not entirely unsound.

It is almost impossible from available data on recent population changes to indicate what relationship exists between changes in farm population by counties and increases in farm mechanization. Counties were classified according to percent of population rural-farm, sub-classified according to rates of change in total population, and these classes were then related to percent of increase in number of tractors. Counties with high percentages of population rural-farm and losing population showed no significant difference in increases in tractor numbers when compared with counties having small percentages of population rural-farm and gaining population. Whether or not the rural-farm population of Valley counties is seriously feeling the "push" that leads to migration of farm mechanization cannot be demonstrated from data now available for recent years.

Social and Economic Problems Associated with Farm Population Trends and Characteristics

Perhaps this attempt to relate population to agriculture can best be concluded by noting certain social and economic problems associated with trends and characteristics of the farm population of the South. The movement of the farm population to urban place both in and out of the region raises the problem of educational facilities for those who leave farms in order that they may be able to adjust themselves to their new environments, usually urban and industrial. The relatively higher rate of natural increase in the South's farm population results in a larger number of children in the school population relative to the productive age group. When this is coupled with the adequate preparation of large numbers who should migrate to prevent pressure on resources, the burden of education is further increased. The ability of agriculture to support these educational demands is not only a southern rural-farm problem, it is also a southern urban problem, and finally a national problem.

It is also important that we shall be well informed concerning possible "pulls" and "pushes" influencing farm population changes so that we can anticipate problems of employment before they are precipitated too sharply. Research on population, therefore, takes on considerable significance.

Perhaps most important is the emphasis which needs to be placed on maintaining in both the region and the Nation not only full but expanding non-agricultural employment opportunities. Otherwise the farm population associated with agriculture tends to increase too rapidly, especially if farm mechanization is advancing at an accelerated rate.

Another important consideration is what happens to rural communities and institutions as the farm population declines. A continuous process of adjustment is taking place in this respect. If it were more consciously

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faced, economic losses, community frustrations, and other critical problems might very well be avoided, or at least more quickly and efficiently met.

That the farm population of the South presents a distinctive problem different from that of other farming regions of the Nation is fully demonstrated by the divergent concern of demographers in the South and those in the West and East North Central States--here the concern is with too many farm people; there it is with too few.

Trends in Business Development Affecting Agriculture

W. K. McPherson, Chief, Industrial Economics Branch, Division of Regional Studies, Tennessee Valley Authority, made a statement to the committee on trends in business development affecting agriculture. Mr. McPherson pointed out that in general trends in business development affect agriculture in two ways:

1. Changes in the level of business activity affect the demand for agricultural commodities.
2. Changes in the level of business activity affect the number of workers engaged in agriculture.

He then called attention to the fact that farmers find it more difficult to adjust production to a constantly changing set of business conditions than do producers of nonagricultural commodities. He expressed the view that the particular ways that changing business conditions affect agriculture and the unique difficulties farmers have in adjusting production to a dynamic set of business conditions constitute one of the major economic problems of the Nation.

"Trends in business during the past 20 years," Mr. McPherson said, "particularly the nonagricultural segment of business, indicate that this type of business activity has not expanded rapidly enough to bring about an efficient use of the Nation's agricultural resources. . . . The net result of these conditions is that a portion of the Nation's soil fertility is being liquidated to maintain the life of a large number of 'subsistence' farmers."

Mr. McPherson concluded that "the nonagricultural segment of the economy has not developed sufficiently to provide economic opportunities for people not needed to produce the food and fiber necessary to maintain the current standard of living."

He urged, however, that a "lesson to be learned from the experience of the past 20 years is that nonagricultural enterprises can, under a favorable environment, operate successfully in small towns and even in rural communities."

In summary, Mr. McPherson stated that business development trends indicate:

1. The need for facilitating adjustments between agricultural and nonagricultural business.

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2. Nonagricultural business development has not progressed fast enough to bring about proper allocation of agricultural resource, hence the many inefficient or under-employed workers on farms. This is particularly true in the Southeast and the Tennessee Valley.
3. The possibility and desirability of developing nonagricultural opportunities in rural areas.
4. The need for developing more efficient business relationships between producers and processors of agricultural raw materials.

RELATIONSHIPS WITH DISTRIBUTORS OF TVA FERTILIZERS

S. L. Clement, Chief, Distributor Relations Section, Division of Agricultural Relations, Tennessee Valley Authority, made a statement to the committee on the relationships with distributors of TVA fertilizer.

Mr. Clement listed for the committee the cooperative organizations with which the Tennessee Valley Authority has contracts, inside and outside of the Valley, and described the general character of these contracts. He then stated to the committee that the activities which are carried on by the TVA in the Valley under these contracts include the following:

Maintaining close working relationships with managers and boards of directors of federations and local cooperatives through personal contacts and attendance at board meetings for the purpose of rendering advisory assistance aimed at increasing the efficiency of the organizations as participants in the regional program.

Assisting in planning for annual membership meetings, participating in such meetings, and assisting in the preparation of reports to the memberships.

Assisting the cooperatives in establishing and maintaining accounting records adequate to serve the needs of the organizations and to supply the information required by TVA.

Assisting the federations and local associations in the preparation of reports to TVA on the costs of distribution of fertilizers.

Analyzing and interpreting fertilizer distribution cost data obtained from the cooperatives.

Collaborating with representatives of the federations and the land-grant colleges regarding the formulation and planning of educational programs of the cooperatives.

Encouraging and assisting in the planning of training schools or workshops for cooperative personnel in the conduct of educational activities, such training schools to be participated in by extension service and TVA representatives.

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Suggesting to cooperatives techniques for making the education efforts more effective.

Negotiation and interpretation of fertilizer distribution contracts.

Outside of the Valley, Mr. Clement said, relations with the cooperatives are of a much more general nature and contacts are less frequent. He also pointed out that in addition to these contracts, TVA has fertilizer distribution contracts with 28 test-demonstration associations or committees which provide for distribution of test-demonstration fertilizers only.

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A. T. Hendrix, Chief, Agricultural Engineering and Processing Section, Division of Agricultural Relations, Tennessee Valley Authority, made a statement to the committee on the subject of agricultural engineering research and development. Mr. Hendrix said, in part:

Farm Electrification

Responsibilities for farm electrification in the TVA were originally assigned to the Agricultural Industries Division. Both research and educational activities were conducted by a staff under the direction of a farm electrification specialist. These activities were carried on in cooperation with state institutions of the land-grant colleges and other local organizations until 1948, at which time responsibility for all rural electrification activities were transferred to the Division of Power Utilization. At the present time the only remaining farm electrification activity in the Branch is cooperative participation in the farm electrification educational work conducted by the State extension specialists under contractual arrangement with TVA. This cooperative program provides (in part) for educational electrification activities in four Valley States. In this category, training schools for county extension workers, community leaders, electric distributor representatives and equipment dealers are conducted on phases such as farm wiring, care and installation of farm electrical equipment, farm water systems, lighting, etc. In addition, farm demonstrations are being established, utilizing electrically powered labor-saving equipment, hotbeds for propagation of plants, chick brooding, poultry house lighting, grain and hay drying, better wiring methods, curing and storing sweet potatoes, etc. No farm electrification research projects are in active status; and no developmental work on equipment for the utilization of electric energy in agricultural production is being carried on.

Farm Machinery and Equipment

Active work in both research and educational phases of farm machinery development is now under way. The developmental projects in this phase of agricultural engineering have been restricted to applications

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which are directly related to the stated objectives of improved fertilization practices and watershed protection. A machine has been designed and constructed for the subsurface placement of fertilizer in sods and sod crops with a minimum disturbance of sod surface. This is an experimental unit constructed specifically for use by agricultural experiment stations in plot studies of fertilization practices. The agronomic results of such studies will determine whether or not effort will be made to develop the machine into a commercial unit.

Another machine which has been designed and constructed is designated as the multiple-purpose mulch seeder. This machine was designed for the placement of fertilizer, small grain, grasses, and legume seeds in either prepared or unprepared seed beds in one operation. Following initial field tests of this machine, functional specifications were prepared and submitted to commercial manufacturers of farm machinery, two of whom fabricated units for trial use. As a result of these preliminary trials, a commercial manufacturer produced four experimental units for field demonstration and experimental investigations. Cooperative research studies are currently underway with five Valley States to determine the most effective spacing of openers, type of shovels, and depth of seeding for the most common conditions encountered in the area. Experimental seedlings made in lespedeza sod, corn stubble, undeveloped pastures, and abandoned areas have shown promising results. Although grain yields in general have been less than those obtained under conventional seeding practices, the results for winter grazing and for subsequent lespedeza hay crop have shown advantage over the conventional method. An additional advantage is a considerable reduction in the cost of seeding below that of the conventional method. Less labor, less power, and less equipment are required; and seedings can be made under soil conditions impractical for conventional grain seeding.

Development of equipment for grain drying is also an active project. The increased production of small grains as winter cover crops, winter grazing, and for grain production, together with the increase in harvesting of small grains by combine, has greatly aggravated grain spoilage due to excessive moisture content. No reliable figures are available as to the extent of grain loss due to this cause, but it is common experience that combined grain, especially, is frequently lost or damaged because of excessive moisture content. This is especially true in the case of corn and small grains which are to be used for seed.

To partially alleviate this situation, the Agricultural Engineering and Processing Branch has conducted studies to determine requirements for grain drying. These studies include an investigation of resistance of various grains to air flow, the volume of air necessary for effective economical removal of moisture, the determination of the drying characteristics of various grains, the determination of the essential air quality for effective drying, the selection of suitable blowers and motors for the engineering installations of driers, and the design of bins and storage equipment. At the present time work has been started on the design and construction of a portable grain drier which can be utilized as an effective unit to be used as either an individually owned or custom job. This would be a supplementary unit to a combine and would have sufficient

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capacity to dry grain directly from the combine, so that grain could be safely placed in storage without fear of damage due to excess moisture.

Another project under way at present is the development of equipment, techniques and procedures for the control of internal smut in grain. Internal smut infection is a considerable factor in small grain production, particularly wheat and barley; and, in the production of foundation seed, it is important that internal smut be controlled. The only known practical method is the "hot water treatment," wherein grain is soaked for periods of time sufficient to activate the smut spore, and then is subjected, under a carefully regulated time period, to accurately controlled temperature in the water bath, which will kill the smut spore without undue injury to the viability of the grain. Former methods of effecting this control were very laborious and messy. Equipment has been constructed and tested which reduces the labor requirements to a practical minimum and which has obtained in practical use very effective kill of smut spores. Plans are now under way to construct (in cooperation with the Tennessee Agricultural Experiment Station) a unit for treatment of seed on experiment station farms and for demonstration to commercial seed dealers.

Consideration is also being given to the development of equipment for the application of lime and fertilizer to steep slopes, particularly those slopes on which these materials cannot be conveniently applied by presently available equipment. A considerable proportion of the available open land used for agricultural purposes in the upper portion of the Tennessee Valley drainage area is steeper than 30 percent slope, on which present equipment will not satisfactorily operate. To date little progress has been made in the solution of this problem.

In the educational phases of machinery and equipment, in cooperation with the State extension services, extensive demonstrations of the mulch seeding machine have been carried on; and training schools are conducted in the selection, care, and use of adapted machinery.

Demonstrations with the multiple-purpose mulch seeder have been conducted cooperatively with the extension services in five of the Valley States. Approximately 2500 acres of unprepared land, such as lespedeza sod, permanent pasture, soybean and cotton stubble were seeded to either small grains, grasses, or clovers, and fertilizer applied in these demonstrations during 1948 and 1949. Field results continue to be quite favorable to this practice for pasture improvement and for temporary grazing. Farmers who have used the multiple-purpose machines, and public service personnel who have observed the practices, appear to be quite enthusiastic.

Farm Structures

In the field of farm structures, TVA has to date exhibited little direct interest in the development of farm housing and farm structures adapted to needs of the Valley area. Present investigations in this

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field are limited to the development of a circular hay storage and drying unit designed and constructed for the mechanization of hay production and for the elimination of manual labor in the handling and feeding of the hay to livestock. A reasonably successful unit has been in operation for two years. Hay is harvested in the usual manner, allowed to partially dry in the field, placed in the structure by means of specially designed elevating blower, automatically distributed, dried by forced air ventilation, and automatically fed to the cattle without manual labor. The capacity of the present unit varies between 40 and 70 tons, depending on the type of hay and the stage of maturity at which cut. This unit is in operation on a Knox County farm, and the farmer reports that he has eliminated the necessity of using two men about one-fourth day each day in the feeding of his beef cattle. As many as 200 head have been fed from this structure at one time.

The planning of grain storage bins in connection with the grain-drying project is the only other research activity in structures in which this Branch is now participating.

The planning of grain and hay-drying installations is the principal educational activity in structures. However, assistance has been rendered periodically to the Plan Exchange Service (southeastern States) in the preparation and reproduction of plans for farm buildings.

Engineering Phases, Soil and Water Control

Through cooperative arrangements with the extension services in four States, schools and demonstrations are being conducted, involving engineering aspects of farm drainage, design, construction and maintenance of terrace systems, water disposal systems, and irrigation; in addition, strip-cropping schools were conducted in another State for county extension personnel. In the latter schools this Branch supplied instructors.

Other Educational Activities

Emphasis is being placed on 4-H Electric Farm and Home Clubs, and through these clubs safe and practical uses of electricity are taught. Through cooperative arrangements, this Branch prepared 21 lessons for use by the extension specialists and 4-H Club departments in Tennessee and Mississippi.

Another youth activity with which this Branch is participating is the tractor maintenance project. This work is in cooperation with the Valley States extension services, and material has been prepared to be used in teaching farm boys how to make simple adjustments on the tractor and how to service it for better performance.

Food Processing and Consumer Studies

The Food Processing Section conducts research to assist in the fuller utilization of Valley-grown crops and livestock through the food processing

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industry. Farmers have a much better market for their output when processing plants exist in the area. The fresh market and processor's market supplement each other in such a way as to prevent very low prices during peak production periods.

Strawberries used to sell well at the beginning of the season and then, as more and more came onto the market, the price dropped to almost give-away levels. Now the berry freezers step in to buy this surplus at almost fresh market prices. These processors have been aided by the Section through research developments such as blast freezers, indirect-immersion freezers, high-production strawberry slicers, and washers. Current research is leading toward improvement in the quality of frozen strawberries. Studies are in progress to reduce mold and other contamination normally encountered.

Other research is undertaken to improve the processing methods for various fruits and vegetables. Considerable work has been done with green beans for freezing and canning. Along with laboratory work to determine what varieties and processing techniques are better, the desires of the consumer public are determined.

We have just recently completed a survey of what the housewife thinks of two varieties of green beans--the Tendergreen and the Logan. The University of Tennessee developed this new Logan bean, which is easier to grow and yields better than the Tendergreen. We found that it was just as easy to process and thought it was of equal quality. However, knowing that the buyer is the final authority, we packed samples of both beans and tried them on the public, in conjunction with the University's Bureau of Business Research. The public said there was very little difference in quality. The horticulturists can now feel confident in telling farmers to grow the Logan. Buyers need have no hesitancy about buying large quantities, and the processors know that the housewife will buy them as readily as the Tendergreen.

Not only do we do research in connection with canning and freezing of fruits and vegetables, but also for the improvement of meat-curing techniques. Many millions of pounds of pork are lost each year in the Valley through spoilage during or after curing. There are many possible causes for spoilage, such as improper refrigeration, inadequate salt penetration, uncontrolled anaerobic bacterial activity, smoking procedures, insect infestation, and mold and slime growth. At times, when all factors seem to be properly controlled, spoilage still sets in. The problem is very complex. For instance, it is commonly thought that if hams are sufficiently salted soon enough, spoilage will be prevented. However, we have found that there are certain spoilage organisms which are tolerant to any degree of salt content within the edible range. All these various factors are being studied one at a time in a series of coordinated studies which we and several State institutions are doing together. The various elements of the whole problem are being attacked by the groups best qualified by background and equipment for each phase of the work. By thus breaking the big problem down into smaller problems and getting many people working on them, we hope to find some of the answers rather quickly.

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FOREST RESOURCE DEVELOPMENT

More than half of the 26 million acres in the Tennessee Valley are in forest and nearly 90 percent of the forest acreage is in private ownership, with about 50 percent of the privately owned acreage on farms. The feasible production from this forest land can be increased to a figure four times the present production. At the same time, employment provided by these forest lands, amounting at present approximately to 50 thousand man-years, could be materially increased on the basis of a sound program of forest development.

Forest Resources and Investigations

Richard Kilbourne, Assistant Director, Division of Forestry Relations, Tennessee Valley Authority, made a statement to the committee on forest resources and investigations. Mr. Kilbourne stated that "forestry investigations work has a single basic objective of watershed protection through optimum development of the forest resources. We get at that by four subobjectives. The first is adequate forest fire control; the second, sustained yield management of our forest lands; and third, the optimum utilization of the forest products that are grown; and fourth, reforestation of lands which, because of erosion or land-use adjustment, need to be planted in trees."

Mr. Kilbourne pointed out that forestry investigations work in the Tennessee Valley is divided, organizationally, into forest economics, forest management, and forest utilization. He gave examples of types of work that are being carried on under each of these branches. As examples of work being carried on by the forest utilization group, Mr. Kilbourne referred to the following:

One of those is the matter of fence post treating. Fence posts make up a very large part of the bulk of forest products cut. They involve a considerable amount of labor. The number of fence posts used in the Valley annually runs into the millions. The labor of cutting fence posts, of curing them, of setting them, replacing them with wire, is a considerable drain on the farmer's time. If we can prolong the life of the fence post, even double it, we can make a real contribution. We have this project set up in which five of the Valley States are cooperating in a series of service tests on various kinds of treatment which can be applied on the farm or in local community treating plants, all in an effort to prolong the life of the fence post.

That project ties in with the pine thinning project, pine management project, because we have found that by going into these young pine stands and taking out all trees which should come out from the standpoint of the benefit of your getting a better growth, that a large percentage of that material can be used as fence posts if it is treated. The copper naphthenate and pentachlorophenol, all of which are now available generally, can be applied in a dipping bath by a very simple process. The farmer with a pine thicket or a farm stand can look to that as a source of fence post material by the addition of this treating material. So we have this project on that.

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Another one that is a little further in the stratosphere, so far as practical application is concerned, is the wood hydrolysis project. That was suggested to us by the Forest Products Laboratory. They were very anxious to have a pilot plant test of wood hydrolysis to supplement the work they are doing at Madison and work that was done on the West Coast. They have made available to us a monel metal digester of one-ton capacity, which is now set up at the chemical engineering plant at Muscle Shoals. We are trying to use that to get some of the bugs out of this rather complex chemical process, utilizing low-grade hardwoods, cordwood type material, which should be removed from the forest stands here in the Valley. There are thousands and thousands of acres of it. It is material which has little or no use, except possibly plywood and some little value for fence posts. But if we can find it has value and can be used in wood hydrolysis, that will provide an outlet for a material which should come out of the woods.

That is a very brief resume of the wood hydrolysis.

Of course, the products of wood hydrolysis are almost limitless. You can get your feeding yeast or your various kinds of so-called molasses for feeding, or you get furfural, or you can go almost any direction you want. We are not too much concerned with carrying the end products through, not as much with that as we are with the actual testing of how to pursue the process in a pilot plant. There have been quite a number of tests made on the end products. The Agricultural Relations Division, in cooperation with several of the Valley States, are testing the molasses which comes out of this process. They are trying it out in various kinds of feeding tests on beef cattle, dairy cattle, and so on. That is one of the aspects of that project.

Reforestation and Forest Management Demonstrations

Kenneth J. Seigworth, Chief, Forest Development Branch, Division of Forestry Relations, Tennessee Valley Authority, made a statement to the committee on reforestation and forest management demonstrations. Mr. Seigworth's statement follows:

Forest Management Demonstrations

TVA's fundamental interest in forest management obviously lies in the contribution which the 14,000,000 acres of forest land--through its 160,000 owners and some 6,000 industries dependent thereon--can make to resource development of the region and full protection of the Tennessee River watershed.

From analyses of major Valley needs and contributions which TVA might make as a regional public agency with its unique facilities and limitations, a principal, current objective of the forest management work is to arouse the interest of people--owners, industries, and agencies--in the opportunities which the region's privately owned forest resource offers.

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TVA's activities and methods in forest management at this stage of regional thinking and development stem from the above judgments and from the following additional considerations:

1. The predominantly private ownership pattern of the region. Eighty-three percent of the forest land is in private ownership. Some 154,000 farmers own approximately five and one-half million acres while approximately 5,000 corporations, families, industries, and individuals own approximately 6,000,000 acres.
2. The obvious need for case illustrations of economically practical, sustained yield forest management in this predominantly hardwood region. As of 1942 there were practically none in the region; now there are several hundred.
3. The relative inadequacy of other programs--public and private--in encouraging and establishing case examples in the Tennessee Valley area.
4. Emphasis on surveys and demonstrations in the TVA Act itself and the Executive Order of 1933 which supplements Sections 22 and 23 of the Act.

The forest management activity is organized principally around and through State Departments of Conservation and the Agricultural Extension Services. Demonstrations on industrial, investment, institutional, and other commercial situations are developed in collaboration with the State Divisions of Forestry of the State Departments of Conservation (trade associations cooperating). Farm woodland management demonstrations are developed in collaboration with the Agricultural Extension Services of the Valley land grant colleges (other agricultural agencies cooperating).

At the risk of over-simplification, it may be said that specific, current regional objectives are to:

1. Establish through the geographic, economic, ownership and forest type range a variety of case examples or demonstrations of applied forest management.
2. Encourage State agencies and trade associations to do more work in the demonstration field and to encourage owners and industries to make full use of private consultants in forest management, processing, and marketing.
3. Make full, effective use of established case demonstrations in spreading desirable forest practices through encouraging visits, study, and emulation on the part of other owners and industries.
4. Continuously observe and evaluate effective methods of arousing land owner and timber operator interest in sustained yield management.

TVA aids State forestry organizations in the forest management demonstration activity through provision of technical manpower, supplemental funds, computing machine and reproduction services.

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Again at the possible risk of over-simplification, the procedure in the development of demonstrations is somewhat as follows:

1. Careful selection of cases for development. Principal criteria are: geographic location, timber situation, type of ownership, and evident readiness of owners "to do what makes prudent forest management sense."
2. A systematic analysis of the situation, including a modest sampling inventory, is made and management possibilities are tentatively determined.
3. The owner and representatives of the public agencies review the findings, revise the tentative management recommendations as appropriate, and agree on management objectives and methods.
4. The owner begins to apply the management plan.
5. A final report is prepared, reproduced, and distributed to other owners throughout the region whose situations may be comparable. This report attempts to record the unique features of the particular situations, including physical, economic, and managerial considerations.
6. All agencies, both public and private, are encouraged to make full use of the case demonstrations.

Reforestation

Simply stated, TVA's interest and objective in reforestation is to have all adapted lands reforested as rapidly and as economically as possible.

The following acreage figures indicate size of the job in the watershed. These data result from a survey made in 1949 in collaboration with the various public agencies participating in the Tennessee Valley reforestation program:

<u>State</u>	<u>Actively eroded lands</u>	<u>Indicated land-use adjustment</u>	<u>Interplanting of understocked woodlands</u>	<u>Total</u>
Alabama	11,510	166,490	103,000	281,000
Georgia	16,250	13,000	63,600	92,850
Kentucky	26,500	28,700	12,000	67,200
Mississippi	2,530	20,970	13,500	37,000
North Carolina	95,204	41,200	39,488	175,892
Tennessee	312,050	275,800	366,000	953,850
Virginia	24,700	73,700	23,000	121,400
Total	488,744	619,860	620,588	1,729,192

Cooperative reforestation projects involving TVA, the State Departments of Conservation, and the Agricultural Extension Services are currently

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operating in Alabama, Mississippi, North Carolina, Kentucky, Tennessee, and Virginia. Provisions of the formal projects are almost identical in the six cooperating States. Briefly, they are as follows:

1. TVA-produced seedlings are made available without cash charge to any landowner in the Tennessee River watershed for bona fide reforestation-watershed protection purposes. This, of course, excludes ornamentals.
2. Landowners apply for the seedlings to the State Forester either through the Agricultural Extension Service or the State Division of Forestry and in writing agree to plant and properly protect the seedlings.
3. It is the intent of the project that the reforestation work provided for shall be conducted on the highest possible level of operation to insure sound results.
4. TVA is interested in the most rapid and most effective reforestation of appropriate areas within the watershed but wants to see this done through full participation not only of the landowners but also of the especially interested State agencies, particularly the State Division of Forestry and the Agricultural Extension Service. In this same connection, TVA desires that the activity be carried on to the full satisfaction of the interested State agencies and in keeping with their relative responsibilities and authorizations within the State.

Last year approximately 4,400 landowners planted slightly over 15,000,000 seedlings within the watershed. This year an estimated 5,000 landowners will plant approximately 16,000,000 seedlings.

LIST OF MEETINGS

<u>No.</u>	<u>Date</u>	<u>Place</u>	<u>Proceedings</u>
1	1933, September 25	Knoxville, Tennessee	Typed, 2 pp.
2	1933, October 7	Knoxville, Tennessee	Typed, 1 p.
3	1934, July 6-7	Chattanooga, Tennessee	Typed, 8 pp.
4	1934, October 27-28	Muscle Shoals, Alabama	Processed, 13 pp.
5	1935, December 12	Chattanooga, Tennessee	Typed, 15 pp.
6	1936, June 26-27	Chattanooga, Tennessee	Processed, 20 pp.
7	1937, February 6	Knoxville, Tennessee	Typed, 7 pp.
8	1937, July 10	Knoxville, Tennessee	Typed, 10 pp.
9	1937, November 3	Knoxville, Tennessee	Typed, 5 pp.
10	1938, April 25	Knoxville, Tennessee	Typed, 13 pp.
11	1938, October 4	Atlanta, Georgia	Typed, 10 pp.
12	1939, April 4	Birmingham, Alabama	Typed, 9 pp.
13	1939, October 3	Chattanooga, Tennessee	Typed, 10 pp.
14	1940, April 2	Knoxville, Tennessee	Processed, 17 pp.
15	1940, October 1	Asheville, North Carolina	Typed, 9 pp.
16	1941, March 4-5	Florence, Alabama	Processed, 32 pp.
17	1941, October 28	Atlanta, Georgia	Processed, 29 pp.
18	1942, March 3	Roanoke, Virginia	Processed, 13 pp.
19	1942, October 6	Knoxville, Tennessee	Processed, 44 pp.
20	1943, May 13	Atlanta, Georgia	Processed, 20 pp.
21	1944, April 3	Knoxville, Tennessee	Processed, 61 pp.
22	1944, October 3	Birmingham, Alabama	Processed, 74 pp.
23	1945, April 3	Atlanta, Georgia	Processed, 67 pp.
24	1945, October 5	Chattanooga, Tennessee	Processed, 88 pp.
25	1946, April 3	Atlanta, Georgia	Processed, 77 pp.
26	1946, October 2	Biloxi, Mississippi	Processed, 93 pp.
27	1947, April 2	Abingdon, Virginia	Processed, 86 pp.
28	1947, October 1	Knoxville, Tennessee	Processed, 71 pp.
29	1948, April 7	Lexington, Kentucky	Processed, 65 pp.
30	1948, October 6	Asheville, North Carolina	Processed, 94 pp.
31	1949, April 6	Birmingham, Alabama	Processed, 81 pp.
32	1949, October 5	Atlanta, Georgia	Processed, 98 pp.
33	1950, May 12	Memphis, Tennessee	Processed, 155 pp.

